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**The practice of standard costing systems in Syrian public companies : an exploration for the impact of institutional, technical and intra-organizational factors : set-theoretic approach**

# The practice of standard costing systems in Syrian Public Companies: An exploration for the impact of institutional, technical and intra-organizational factors. Set-theoretic approach.

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# Abstract

An ongoing debate in the management accounting literature concerns the insufficiency of new institutional sociology in explaining organizational behaviour and the need to combine this approach with other competitive and intra-organizational factors in order to understand management accounting change better.

This thesis examines the practice of standard costing systems (SCS) in Syrian manufacturing public companies (SPCs). It additionally explores the relevance and interplay between institutional predictors, especially Government coercive pressure, together with other technical and intra-organizational willingness and capacity contingent variables in shaping both conformity and resistance to institutionally induced SCS.

A questionnaire instrument was derived from analysis of historical and contemporary literature and exploratory visits to companies in Syria. It was hand-distributed to a cluster sample of 53 SPCs representing more than 50% of the population of 96 SPCs. Descriptive statistics revealed that only 44.4% of SPCs employed SCS and then only partially. Different nonparametric tests were utilized to test the research hypotheses and to reveal the relevant factors of interest. Set-theoretic tools, qualitative comparative and fuzzy set analyses, were used to explore the interplay between the most relevant institutional and intra-organizational factors in shaping the conformity (use) and resistance (non-use) of SPCs to the institutionally induced SCS. Coercive pressure and cognitive capacity were found to be necessary (but not sufficient) requirements for SCS to be introduced.

The findings provide insight into the practice of SCS in Syria, a less developed country. The research findings have implications for the policy setters in the public sector in Syria. They add to our understanding of the complementary nature of institutional and contingent elements and the need for future research to consider both theories. This research also demonstrates the promise of set-theoretic tools in better capturing the complexity of management accounting change as a social phenomenon.

**To my father and mother; to my wife Samaher; to my children Allaa, Hadil, Hala; to my brothers and sisters; to my friends; and all whom I love**

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# Author's Declaration

I declare that the work in this thesis was carried out in accordance with the Regulations of the University of Bristol. The work is original, except where indicated by special reference in the text, and no part of the thesis has been submitted for any academic award. Any views expressed in the thesis are those of the author.

Signed Ali Ibrahim ..... Date 08 June 2007

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# Chapter (1): Overview of the research

## 1-1 Introduction:

Standard costing systems (SCS) are one of the oldest management accounting (MA) techniques with underlying ideas dating back to the late 19th and early 20th centuries.

Standard costs have been defined as 'predetermined costs: they are target costs that should be incurred under efficient operation conditions.' (Drury, 2004: 726). They represent a benchmark by which actual costs are measured and compared, and variances are identified and reported to help managers make better decisions and exert control over operations.

In the course of a century the system has developed and achieved wide acceptance in practice in different countries. Research in developed countries such as UK (Drury, Braund, Osborne and Tayles, 1993; Dugdale, Jones and Green, 2006; Puxty and Lyall, 1989); New Zealand (Guilding, Lamminmaki, Drury, 1998); and USA (Cress and Pettijohn, 1985; Fry, Steele and Saladin, 1998) revealed that SCS continues to be widely used. Research in some other less developed countries is still limited, yet the available studies show similar findings and the use of SCS is strong (Joshi, 2001; Sulaiman, Ahmad and Alwi, 2004). Despite the widespread use of SCS in practice, the system has been intensively criticised by some authors as being incompatible with the conditions of new manufacturing environments (Ferrara, 1995: 34; Fry et al 1997; Howell; 1987; Johnson and Kaplan, 1987; Kaplan, 1987; Monden and Lee, 1993). It was argued by some authors that to prosper in today's competitive environment companies should focus on issues such as improving quality, increasing flexibility to meet customers' requirements,

reducing inventory and product costs (Lucas, 1997:32). SCS, however, was blamed as being counter-productive in such environments by encouraging dysfunctional behaviour (Ferrara, 1995; Lucas, 1997; Sulaiman, et al, 2005: 110).

This observation in the MA literature appears to contrast with the profit maximization assumption, a basic foundation of the contingency approach in MA research, and supports the new institutional sociology (NIS) premises of isomorphism and homogeneity of organizational practices (Meyer & Rowan 1977; DiMaggio and Powell 1983; Zucker, 1987; Powell & DiMaggio, 1991).

In contrast to this general appearance of isomorphism in the use of SCS in different countries, in Syria there is not sufficient evidence for the actual practice of SCS, despite the apparent institutional environment of government regulations that require its use in all public companies.

The development of SCS and the other accounting systems in Syria have been greatly influenced by the political and socioeconomic conditions that shaped the different aspects of the social life in this country.

The unique style of socialism that was adopted around 1963 has shaped the structure of the Syrian economy, with more emphasis being placed on the public sector in leading the development process. In 1970 the government adopted the pluralism[1] style, which aimed at activating the roles of the different sectors in economic development. However, the public sector continued to dominate the main industries (Al-Zaim, 2004: 9).

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[1] Pluralism is the term that Syrian authors usually use to describe the economic system, that was adopted in Syria around 1970, which relies on acknowledging independent and active roles for four different economic sectors, namely public, private, joint, and co-operative sectors( see Al -Zaim, 2004: 9)

This predominance of the public sector provoked the construction of a set of regulations that sought to organize its management. The most important regulation, which had crucial implications for accounting practices in Syria, is legislative decree number 287 (1978) that embodied the unified accounting system (UAS).

The UAS has been considered a turning point in accounting history in Syria, and triggered the creation of real organized accounting practices in Syrian public companies (SPCs) (Fakher, 1993: 109).

The main feature of UAS is the remarkable interest shown by government authorities in organizing the two aspects of accounting, namely MA and financial accounting.

The rules embodied in this system required that SCS should be used by all SPCs (Decree 287, 1978: Rule 10). There is, however, little evidence in the published MA literature in Syria concerning the extent to which SCS is actually in use in SPCs and how it has been implemented. Moreover, authors in this country have cast doubt on the extent of SCS use in actual practice (Helwa-Hanan, 1987; Fakher 1993: 112).

This gap in the Syrian MA literature questions the adequacy of new institutional sociology NIS, and contrasts the basic foundations of this theory, which has been criticized for its assumption that conformity is always the organizational response to institutional pressures (Oliver, 1991: 146); for its overemphasis on the extra organisational forces that cause institutional isomorphism; and for its neglect of the influence of other intra-organizational and technical factors (Oliver, 1991; Kraatz & Zajac 1996; Burns & Scapens 2000; Modell, 2002; Tsamenyi, Cullen, González, 2006).

## 1-2 The research problem and research questions:

Institutional theory has considerable implications for the study of MA, manifested by the considerable body of research that relies on the institutional approach (e.g. Brignall and Modell, 2000; Carruthers, 1995; Malmi, 1999; Burns, 1999; Burns and Scapens, 2000, Modell, 2001, 2002, 2003; Bennett at al, 2004; Tsamenyi et al, 2006).

Notably absent from the literature, however, is sufficient evidence for the interplay between the institutional forces, informed by NIS, and other intra-organizational and technical contingent factors that are likely to affect the resistance or conformity of organizations to institutionally induced MA practices (Carruthers, 1995; Malmi, 1999, Modell, 2002).

MA literature has recently seen some research that depicts the MA change through combining extra institutional and intra-organizational influences (Malmi, 1999; Modell, 2002; Major & Hopper, 2003; Tsamenyi et al, 2006). However, the empirical evidence to support the insufficiency of NIS predictors and the combinatorial effect of institutional and intra-organizational factors in shaping change in MA practices is still limited.

Bearing this theoretical debate on MA research in mind, the gap in Syrian MA literature, concerning the lack of documented evidence for the practice of SCS in SPCs despite the coercive institutional pressures, provokes three main questions.

First: "to what extent is SCS actually in use, and how has it been implemented in SPCs and what insights can be gained from this implementation?"

Second: "to what extent are different institutional coercive, technical competitive and intra-organizational willingness and capacity factors associated with the extent of use of SCS in SPCs?"

Third: "how are the most relevant factors combined together, and in what ways to affect the conformity or resistance of SPCs to the adoption of institutionally induced SCS?"

Built on the arguments of some institutional theorists (Oliver, 1991; Clemens and Douglas, 2005, 2006) and some MA researchers (Chenhall, 2003; Modell, 2002; Tsamenyi et al, 2006) concerning the need to incorporate other intra-organizational and technical contingent elements to the predictors informed by NIS, it is argued in this thesis that the extent of use of SCS, that is the conformity of SPCs to institutionally induced SCS, is associated with external institutional coercive pressure and certain other defined technical and intra -organizational willingness and capacity factors, which combine together in affecting the responsiveness of SPCs to institutional pressures.

This thesis, therefore, uses an extended NIS approach, survey instrument, and relatively new methodological and analytical tools (qualitative comparative analysis QCA) to answer the research questions.

In doing so the researcher intends to combine institutional, technical and intra-organizational willingness and capacity elements to explore the interplay between these factors in shaping the change in MA practices, and provide better understanding into the development and the practice of SCS in SPCs.

## 1-3 Importance of the research:

The importance of this research stems from several facts related to the literature of MA in general, and the literature and practice of MA in Syria in particular. The following are some of these facts:

1- The institutional approach has received considerable interest in the literature of MA research in recent years, particularly the combination of this approach with other theories such as contingency theory (Chenhall, 2003; Modell 2001, 2002; Tsamenyi et al, 2006). However, there is little empirical knowledge of how institutional and intra-organizational factors are combined to shape change in MA practices. The research is, therefore, an endeavour in this direction by exploring the most relevant institutional, technical and intra-organizational willingness and capacity factors associated with the extent of use of SCS in SPCs on one hand; and on the other hand, it seeks to unravel the complexity of MA change by exploring the different combinations of relevant conditions under which SPCs responded or resisted institutionally induced SCS.

2- The published management and economic research in Syria has put considerable emphasis on managerial and economic reform of the public sector in recent years (Abdel Nour, 1999; Al-Khouder, 2004; Salama, 2000; Al-Zaim, 2003). Studying SCS practices in SPCs and the different intra-organizational and external factors that affect its use would contribute to this body of research in the managerial reform of the public sector in this country. Furthermore, exploring the different combinations of conditions connected with conformity or resistance to institutionally induced practices would help

decision makers and policy setters in the public sector and guide them to those conditions that require special attention.

3- There is not sufficient evidence for the practice of SCS, or the other MA techniques that are in use in SPCs. It is timely therefore to examine MA practices in Syria. Studying the practice of SCS in SPCs is a first step, given the tremendous challenges that the Syrian economy is expected to face as a result of changes in the market conditions.

4- The research that has examined MA systems in less developed countries is still limited. Thus this study adds to the body of knowledge about MA practices in those countries.

5- The research uses a relatively new methodological approach, qualitative comparative analysis (QCA), which has not been yet explored in the MA discipline. Thus, it adds to the available research armouries, which have been traditionally used by MA researchers, another tool that seems promising in better capturing the complexity of the change in MA systems as a social phenomenon.

## 1-4 Research objectives:

- To examine and explore the extent to which SCS is in use, how it has been practiced, and gain insights into its implementation in SPCs.
- To examine the association between the identified institutional, technical and intra-organizational willingness and capacity factors and the extent of use of SCS in the SPCs.
- To use QCA and fuzzy set logic in order to explore the different combinations of the most relevant institutional, technical and intra-organizational conditions,

which are connected with the conformity or resistance of SPCs to the institutionally induced SCS and their implications for the institutional theory in MA.

## 1-5 Structure of the thesis:

The thesis has been structured according to the logical flow of the steps and procedures that have been undertaken in the course of the research process.

The remainder of the thesis, therefore, has been divided into the following chapters:

Chapter 2 outlines an ongoing debate in MA literature and organizational theory and derives the suggested theoretical framework that underpins the discussions in the thesis. The selection of this theoretical framework was influenced by some early insights that the researcher has observed from the literature search of the historical roots of the development and practice of SCS theory in general and in SPCs context in particular. The suggested theoretical framework was, therefore, a result of iterations and interactions between relevant literature search, theory debates and site visits, which the researcher undertook at the early stages of the research.

In chapters 3 –4, the researcher used the suggested theoretical framework to refine the relevant literature historical search in order to unravel the different institutional and intra-organizational factors that affected the development and the practice of SCS. As far as chapter 3 is concerned the researcher examined the origins of SCS theory and the institutional, technical and intra-organizational factors that governed

its development. This step was particularly important because it enabled the researcher to focus on potentially relevant conditions, which might be linked to the practice of SCS. This in turn could facilitate the operationalization of the main constructs of interest. The lack of knowledge on the practice of SCS in SPCs called for this general literature search. Furthermore; the researcher intended to use this historical evidence to validate the suggested theoretical framework, and to provide some historical support for a potential combinatorial effect of institutional, technical and intra-organizational conditions on MA change. More emphasis in this chapter has been placed on the Anglo-Saxon (UK and USA) MA literature, as the system has its historical roots in this literature.

Chapter 4 presumes the historical analysis by investigate the institutional the technical and organizational peculiarities that characterized the development of standard costing in Syrian context. This again is an important step to understand the characteristics of the context in which SCS was invoked and to unravel potentially influencing factors.

Chapter 5 discuses the rationale for the selected research methodology, articulates the research hypotheses, and explains the different stages in developing the research instrument and data collection procedures.

Chapter 6 is devoted to achieving the first objective of this research. It provides a descriptive analysis for the survey results, concerning the practice of SCS in SPCs, and depicts the different insights gained from exploring this practice.

Chapter 7 represents an introductory chapter to data analysis, which deals with the development of the indexes that measure the main composite variables in this research and demonstrate their reliability by using Cronbach's alpha analysis to check internal consistency.

Chapter 8: represents an intermediate stage of data analysis, which reports the results of formal statistical tests of the research hypotheses thereby achieving the second objective of this thesis.

Chapter 9: uses the significant factors resulting from hypothesis testing to explore the different blends of conditions under which conformity (use of SCS) and resistance (non use) of SPCs to the institutionally induced SCS occurred, and presents implications of the results for NIS by applying QCA and fuzzy set analyses.

Finally Chapter 10 reports the research conclusions.

# Chapter (2): The research theoretical framework:

## 2-1 Introduction:

The early generation of organization theorists, such as Weber (1946), concentrated on rationalization and saw the organization as a closed and bureaucratic system (Chenhall et al, 1981; DiMaggio & Powell, 1983).

This understanding, however, isolates the organization from its environment, which induced modern theoretical streams in organization theory that recognized the organization as an open system; affecting and affected by the external environment (Chenhall et al, 1981: 2).

There has been, however, disagreement among theorists on how they perceive the environment. This led in turn to different views, even in the same theoretical stream.

In institutional theory, Powell and DiMaggio (1991: 3) have referred to the fact that there are today many new institutionalisms; the disciplines of economics, political science, international relations, and sociology have all renewed their interest in institutions.

There has been increasing concern in applying institutional perspectives in MA research to explain the forces that cause MA change (Bennett, Bouma and Ciccozzi, 2004; Burns and Scapens, 2000; Carruthers, 1995; Covaleski, Dirsmith, and Michelman, 1993; Modell, 2001, 2002; Tsamenyi et al, 2006).

Three directions of using institutional theory in MA literature have been documented (Burns, 1999); new institutional economics, which relies on the concept of rationality and equilibrium of the firm (see Walker, 1998); old institutional economics, which perceives MA as rules and routines and focuses on the institutionalization of these routines within the organization (see, Burns, 1999;

Burns and Scapens 2000); and lastly, new institutional sociology, which considers the change in MA institutions from the perspective of an extra-organizational point of view (Bennett, et al 2004; Covaleski, Dirsmith, and Michelman, 1993; Modell, 2001; 2002; Tsamenyi et al, 2006).

Another rival and, apparently, conflicting perspective, which dominated MA research is contingency theory (Chenhall, 2003: 127; Drury, 2004). The contingency perspective's theoretical grounds revolve around core arguments, which entail that, 'there is no 'best' way to approach organizations, but that the organizational design should reflect the environment in which it is found' (Berry, Broadbent and Otley, 1995: 22). Firms are, therefore, expected to act rationally and to seek to tailor their MA systems and the other organizational structures to fit the characteristics of their environment (Otley, 1987: 9), in order to enhance their performance thereby increasing their potential of survival (Chenhall, 2003: 134; Drury, 2004: 698; Roggenkamp, White and Bazzaoli, 2005).

These arguments, however, contrast with new institutionalists' views, which see organizational structure as being more affected by institutionalized forms of rationality induced by the external environment than by task technology (Covaleski and Dirsmith, 1983: 325). Striving for social appearance and incorporating socially accepted rules of behaviour, rather than maintaining efficiency and improving performance, are seen to contribute better to organizational survival (DiMaggio and Powell, 1983; Meyer and Rowan, 1977; Oliver, 1991: 146).

There has been, however, a growing recognition by many authors in the field of MA research (Chenhall, 2003; Malmi, 1999; Major and Hooper, 2005; Mitchell and Walker, 1997: 98; Modell, 2001, 2002; Tsamenyi et al, 2006) and other disciplines, such as organizational theory (Oliver 1991, 1997; Kraatz and Zajac,

1996; Clemens and Douglas, 2005, 2006) and operations management (Ketokivi and Schroeder, 2004) of the inability of these two approaches, viewed in isolation, to provide sufficient explanation for many organizational behaviours.

In operations management for example, Ketokivi and Schroeder have referred to some observations in the literature of this field, such as the wide use of TQM in the 1980s and 1990s despite the mixed pictures and high profile of failure, which inspires:

> *"an explanation that on its face seems to deny a number of key aspects and assumptions of economic profit-maximization rationality one of the cornerstones and basic assumptions in OM [operations management] research" (2004: 63).*

Similar observations could be found in MA research where some authors have shown that many organizations seem to use SCS in a task environment, which is allegedly not suitable for such use (Fry et al, 1997: 522).

Otley has cited Jones's (1985) study, where the latter author compared pre- and post-acquisition accounting systems of both the acquired and acquiring companies, and found no impact of contingent factors, but that acquired companies accounting systems resembled those of acquiring companies. Otley then thought that this may indicate that:

> *"contingency theory is itself inadequate, certainly for business units that are owned by larger entities" (1987: 97).*

These examples undermine the basic foundations of the traditional contingency approach, and apparently lend support to NIS explanations.

The above observations in MA literature might indicate the potential of the two theories to complement each other. Though the two theories, apparently, seem to be different paradigms, they, however, share many commonalities. For example, both

theories consider the external environment as a key factor that exerts pressures on organization (DiMaggio and Powell, 1983; Chenhall et al, 1981:xvi; Hayes, 1981); institutionalists (DiMaggio and Powell, 1983: 149; Scott and Meyer, 1983) and contingency theorists (Khandwalla, 1972; Chenhall, 2003; Watts, 1993:605) alike considered competition and uncertainty as key aspects of the environment that affect organizational behaviour; both theories consider that organizations should respond to their environment in order to survive (Oliver, 1991; Scott and Meyer, 1983; Watts, 1993); both theories agree that there might be underlying rationality for organizational behaviour (Chenhall et al, 1981: 1; DiMaggio and Powell, 1983: 147). Eventually, institutional factors could be seen as contingent factors. These commonalties indicate the possibility of combining elements from both theories (institutional and economic derived elements of the environment) to gain better understanding to MA change (Chenhall, 2003: 139).

The theoretical framework that underpins the discussions in this thesis is guided by a modified model of the NIS suggested by Oliver (1991). It combines the NIS approach with other organizational theories particularly contingency or resource dependence perspectives. This approach has been recently either suggested or used by authors in the fields of organization theory (Ingram and Simons, 1995; Kraatz and Zajac, 1996, Oliver, 1997; Clemens and Douglas, 2005, 2006) and MA research (Malmi 1999; Modell, 2001, 2002; Chenhall, 2003; Tsamenyi et al, 2006). Given that MA change in SPCs seems to be in response to regulatory pressures and direct authority relations with supervisory authorities, given also the changes in market conditions toward more competitive environments, the extended NIS

model, discussed later in this chapter, seems more appropriate to capture the mechanisms of MA change in this context.

Before extending the discussion about this suggested theoretical framework, which will be used to explore different conditions connected with conformity or resistance of Syrian public firms to the institutionally induced SCS, it is essential to point out the core theoretical premises of NIS.

Accordingly, this chapter is structured as follows: the first section will concentrate mainly on the ideas underpinning NIS and its potential benefits for MA research; the section that follows will discuss the drawbacks of NIS and present the suggested theoretical model that will be examined in SPCs context.

## 2-2 The new institutional sociology and organizational isomorphism:

The core argument of NIS revolves around the homogeneity of organizational forms in response to institutional forces, and formal structures in many organizations reflect the myths of the institutional environment in order to gain legitimacy (Meyer & Rowan 1977; DiMaggio & Powell 1983; Powell & DiMaggio, 1991).

Early institutional sociologists articulated the meaning of institutions and perceived them as rational rules and myths which when adopted enhanced the legitimacy of organizations (Meyer& Rowan, 1977: 340).

Seeking conformity with rational rules and myths, and legitimating the organizational forms will lead to decoupling that makes the formal structures of

many organizations 'reflect the myths of their institutional environments instead of the demands of their work activities' (Meyer& Rowan, 1977: 341).

In their 1983 work, DiMaggio and Powell rejected the rational model of organizational behaviour, which considers market conditions, competition and the need to improve performance as main sources of organizational change. They argue instead:

> *"bureaucratization and the other forms of the organizational change occur as a result of processes that make organizations more similar to each other without necessarily making them more efficient." (Powell & DiMaggio, 1991: 64).*

Competition, as the institutionalists contend, explains only part of the process of homogenization that occurs at the early adoption of innovative practices. Complete understanding of organizational change requires that this market derived force 'must be supplemented by institutional view of isomorphism' (DiMaggio & Powell 1983: 150).

The concept of "isomorphism", therefore, has been used by institutional theorists to connote the process of homogeneity in the organizational structures, which is, as they claim, not necessarily derived by the goal of improving efficiency (Caruthers, 1995: 315).

The early adopters of organizational innovations, in common, are driven by the desire of improving performance, but when the techniques become well established the process of seeking legitimacy matters, rather than developing efficiency (Meyer & Rowan 1977: 348, Powell & DiMaggio, 1983: 148).

In discussing the main sources and patterns of isomorphic change, DiMaggio and Powell (1983), have differentiated three institutional sources of isomorphism, in addition to the market competition. Each of the three types of institutional

isomorphism stems from a certain force in the institutional environment that causes homogeneity.

- **Coercive isomorphism:**

This kind of change stems from the political influence and the formal and informal pressures exerted on organizations 'by other organizations upon which they are dependent' (Carruthers, 1995: 317), and /or by other social bodies.

Zucker argues, 'Institutional environments obtain their defining power from 'rationalization' and from accompanying state elaboration' (1987: 444), such pressures may be felt as imposition, as persuasion, or invitational.

According to DiMaggio and Powell institutional change, in some cases, is 'a direct response to the government mandate: manufacturers adopt new pollution control technologies to conform to environmental regulations' (1983: 150).

Myths and rules become more legitimate and spread widely if they are based on legal mandate. As Meyer and Rowan argue:

> *"The stronger the rational-legal order, the greater the extent to which rationalized rules and procedures and personnel become institutional requirements" (1977: 347- 348).*

The coercion of organizational structures occurs not only by means of state mandates and legal power, but also through 'direct authority relationships' (DiMaggio & Powell, 1983: 151) between large or influential organizations and other organizations in their field. For example 'Subsidiaries must adopt accounting practices, performance evaluations, and budgetary plans that are compatible with the policies of the parent corporation' (DiMaggio and Powell, 1983: 151).

State regulations, legal environment, and focal organizations are, therefore, the key forces that coerce rational procedures and affect organizational practice and behaviour. Consequently 'organizations are increasingly homogenous within given

domains and increasingly organized around rituals of conformity to wider institutions' (DiMaggio and Powell, 1983: 150).

- **Normative isomorphism:**

This isomorphic change is driven mainly by the influence of the professional bodies. Professional rules and normative training are expected to cause homogeneity in organizational practices.

Institutionalists have interpreted professionalization as cumulative efforts exerted by members of an occupation to establish the methods of their work (DiMaggio and Powell, 1983: 152).

Professions have become a main source of rational norms and rules of behaviour. Such rational methods will diffuse across a field through the professional personnel who will reflect their experience in their organizations (Carruthers, 1995: 317). Thus, 'Universities and professional training institutions are important centres for the development of organizational norms' (Powell and DiMaggio, 1991: 71) and professional networks, in turn, facilitate the diffusion of the normative rules and patterns and enhance homogenization.

- **Mimetic isomorphism:**

Environmental uncertainty is a powerful force that causes emulation and increases institutional isomorphism (DiMaggio and Powell, 1983; Kraatz& Zajac, 1996). Ambiguity might characterize organizational objectives and technologies, organizations might face a problem but do not know the solution and in such cases

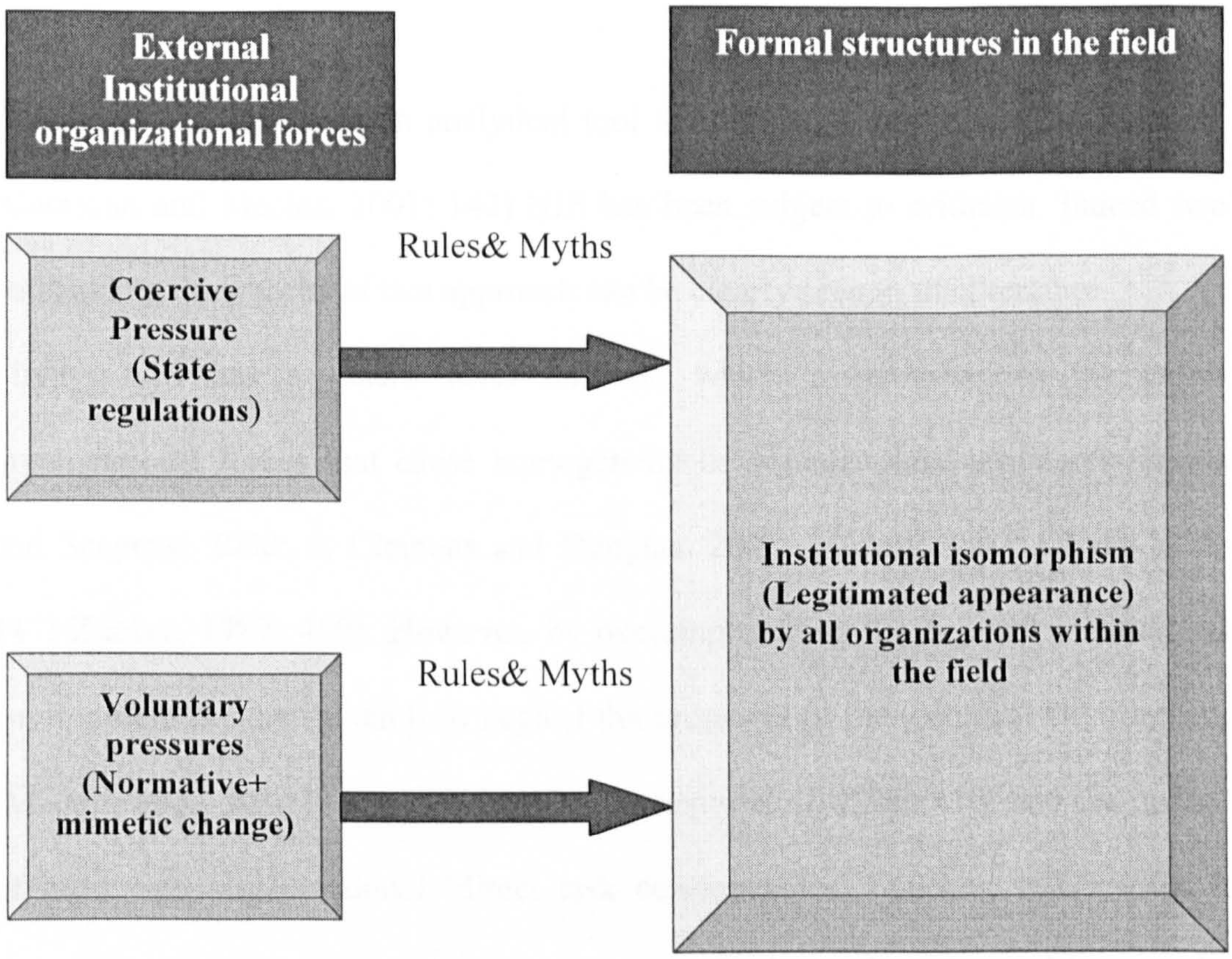
organizations try to imitate other organizations, which they consider successful, and do what other organizations do in such situations.

'Modelling' is the term used by institutionalists to refer to the copying process (DiMaggio & Powell, 1983: 151). They believe that, although there are some innovators who consciously create new practice, there are others who imitate. This imitation increases the homogeneity in organizational practices, which in turn stems from the relatively little variety of choices (DiMaggio and Powell, 1983: 151-152).

NIS, therefore, has considered the state, professions and environment uncertainty as being particularly important means by which rationalized practices are diffused across organizations. Showing conformity to the rational myths and rules to gain legitimacy (which leads to inertia), the homogeneity of formal organizational structures and the stability of institutional components are basically the main features of NIS (Kraatz & Zajac, 1996: 814).

Figure (2-1) summarizes the mechanism of institutional change as it is prescribed by NIS. As can be seen from the figure the theory depicts the external forces that produce rules and myths that govern organizational behaviour and cause the appearance of homogeneity in organizational structures. The figure shows the macro level analysis of the theory, by focusing on the peripheral elements of organizational environments, (Powell and DiMaggio 1991: 13) particularly the external institutional factors.

**Figure (2-1) NIS model of isomorphic change**




The theory has been acknowledged as being a powerful analytical tool by many MA researchers, which could provide interpretations of many MA practices and procedures (Carruthers, 1995; Modell, 2002; Bennett et al, 2004; Tsamenyi et al, 2006). It is argued that NIS provides an 'influential research framework in management accounting research' (Carmona and Macías, 2001: 142). Yet the peripheral and macro level focus of the theory made it subject to criticisms by other authors who suggested an extension of the NIS as the next section shows.

## 2-3 The drawbacks of NIS Model and the need to consider other technical (competitive) and intra-organizational elements-suggested model:

Despite its usefulness as an analytical tool and its implications for MA research, (Carmona and Macías, 2001: 142) NIS has been subject to criticism. Indeed two outstanding drawbacks of this approach can be clearly seen in the literature.

Firstly, NIS has a macro level outlook, which overemphasizes the extra-organizational forces that cause homogeneity in organizational structures (Burns and Scapens, 2000: 5; Clemens and Douglas, 2006; Modell, 2002; Oliver 1991: 147; Zucker, 1987: 450). However, by overemphasizing the external institutional environment the theory tends to neglect the pressures of the technical environment (Modell, 2002: 655; Oliver, 1991: 147; Tsamenyi et al, 2006: 410) and the impact of other intra-organizational 'direct task contingencies' (Zucker, 1987: 450). It perceives change as caused through the force of rules and myths, and ignores the interplay between institutional and other intra-organizational and technical factors (Modell, 2002: 655; Tsamenyi et al, 2006: 410).

Secondly the theory considers the conformity with myths, in order to maintain legitimacy and demonstrating social worthiness (Oliver, 1991: 150), as the main incentive for change rather than developing efficiency. Seeking legitimacy, however, 'doesn't necessarily conflict with the achievement of economic efficiency through adjustment to competitive conditions and the other technical prerequisites' (Modell, 2002: 655). Moreover, it emphasizes conformity rather than resistance and perceives organizations as being always passive in their responses to institutional pressures and expectations (Oliver, 1991: 146).

These criticisms led some sociologists (Clemens and Douglas, 2005, 2006; Kraatz & Zajac, 1996; Oliver, 1991; 1997; Roggenkamp et al, 2005 ) and more recently MA researchers (Malmi, 1999; Model 2001,2002; Tsamenyi et al, 2006) to theorize and use adjusted models of institutional theory that incorporate other theoretical arguments informed by contingency or the resource dependence approaches into NIS.

In organization theory for example, Oliver has combined resource dependence and new institutional perspectives to predict the different strategies that organizations might use to respond to the institutional forces that affect them. She argues that:

*"organizational behaviour may vary from passive conformity to active resistance in response to institutional pressures, depending on the nature and context of pressures themselves" (1991: 146).*

She differentiates among five strategies that organizations might adopt in direct response to institutional pressures exerted on them, 'acquiescence', 'compromise', 'avoidance', 'defiance', and 'manipulation' (1991: 152-157).

She further suggests that the institutional theory can help in addressing different reactions to the institutional pressures if it considers the variations in the ways in which organizations respond to such pressures. The conformity (or resistance) of the organizations to institutional rules is based on 'the willingness and the ability of organizations to conform to the institutional environment' (1991: 159).

Several authors in the field of organizational theory have built their works on Oliver's framework, (Ingram and Simon, 1995; Clemens and Douglas 2005) and examined the different institutional factors associated with the strategic organizational responses conceptualized by Oliver and found some support for her predictions.

In recent years, a considerable interest has emerged among some MA researchers for the need to combine the external institutional pressures with the other technical and intra-organizational factors to gain better understanding for the change in MA practices (Burns and Scapens, 2000; Chenhall, 2003; Malmi 1999; Modell, 2001, 2002; Tsamenyi et al, 2006).

Burns and Scapens (2000), for example, emphasised intra-organizational processes in their model of change. But the authors acknowledge that they could not ignore the impact of the extra-organizational pressures. They also suggested, 'management accounting change has also to be understood in terms of the behaviour of individuals and groups within organizations' (Burns and Scapens 2000: 22).

Modell (2002) has followed Oliver's approach by building a theoretical framework, which combines the institutional, technical and intra-organizational elements. He argues that such a combination would provide better understanding of why and how organizations allocate indirect costs (Modell 2002: 673). In his analysis, Modell has reviewed several studies to explain the influence of the institutional pressures on cost allocations, contending that the implementation of cost allocation will be affected by how organizations respond to institutional forces (Modell, 2002: 655). He further urges the need for 'more systematic studies of how isomorphic pressures interact with intra-organizational and technical factors' (Modell, 2002: 673) in affecting the change in MA practices (such as the cost allocation methods).

Some authors have provided also case study evidence, which seems to support some of Oliver's hypotheses and her conceptualization of organizational change as an outcome of institutional and technical pressures and other intra-organizational factors (Carmona and Macías, 2001; Modell, 2001; Major and Hopper 2003; Major and Hopper, 2005; Tsamenyi et al, 2006).

In his case study of performance measurement in a large Norwegian hospital, Modell found evidence for the impact of 'both legitimacy seeking and efficiency enhancing' motives on the adoption of institutionalized performance measures in the case study hospital (2001: 457-458).

Major and Hopper's (2003: 27) case study has shown also a potential impact of the willingness of the internal actors and the conflicts for power that emerged among them on the outcomes of the institutional pressures. The authors have found that:

*"the resistance of the engineers from the production department towards the ABC system stemmed from their unwillingness to accept the growth in power that commercial department had gained...." (2003: 27).*

More recently, Major and Hopper draw attention also to the importance of 'education and training' for ABC implementation in their case study of a Portuguese telecommunications firm, beside the effect of institutional concern of 'satisfying external constituents' (2005: 223).

Other MA researchers contend that technical requirements (market pressures) and the institutional pressures do exist together (Major and Hopper, 2003: 25- 26; Mitchell and Walker, 1997: 98; Tsamenyi et al, 2006). For example, Tsamenyi et al argue 'institutional and market forces are not dichotomous but rather both exert pressures on organizations' (2006: 413). In their case study of 'Sevillana', a large

Spanish electricity company, the authors' findings give some support for the interplay between coercive institutional and market derived pressures. They note,

*"Apart from designing structures to satisfy the regulatory environment (coercive isomorphism), the group also implemented policies to promote efficiency because of the competition (Market forces)" (2006: 428).*

Mitchell and Walker found historical evidence, which might support the potential impact of both market and institutional pressures on the adoption of uniform costing in the printing industry in the UK. Their evidence, however favoured the impact of market contingencies, which they considered more powerful than the institutional pressures of trade associations (1997: 98-99).

Despite the growing concern in the MA literature with the inadequacy of NIS theoretical arguments to explain variations in the responsiveness of organizations to external pressures, there is still, however, minimal research into the combinatorial effect of institutional and other intra-organizational factors on the conformity or resistance of organizations to the external demands (Modell, 2002: 654). Little knowledge is also available about the different combinations of those conditions under which the varying organizational responses come about. Certainly the importance of case study evidence cited above, in respect of increasing our knowledge of the complexity of MA change, and drawing our attention to possible combined effects of institutional, technical and intra-organizational conditions on the organizational responses to environmental demands, cannot be neglected. The available evidence, however, is unable to add to our understanding for the different combinations of institutional and intra-organizational conditions under which conforming or resisting behaviours could happen. Neither can the available literature provide any statement about the necessary and sufficient conditions for resisting or conforming behaviours, or whether the observed patterns in the cited

case studies could be held true in a larger population. This is actually admitted by some authors (Major and Hopper, 2005: 225; Modell, 2001: 461; Tsamenyi et al, 2006: 429). For instance, Tsamenyi et al:

*"We see opportunities for future comparative empirical case studies to further our understanding on how accounting is shaped by the interplay between institutional and market forces, as well as the interplay between institutional forces and intra-organizational power relationships" (2006: 429).*

Finally, most of the mentioned studies focused on how change did occur (Major and Hopper, 2005; Modell, 2001: 461), while better understanding of MA change requires also considering the conditions under which MA change may fail (Granlund, 2001).

Drawing on the above discussions, particularly Modell' s (2002) and Oliver's (1991) theoretical arguments and the previously mentioned gap in Syrian MA literature, it is argued in this thesis that the extent of use of institutionally induced SCS in SPCs is associated with certain extra organizational institutional and technical conditions and other intra-organizational factors (related to the willingness and capacity of those companies to conform); and that it is the combination of the institutional elements with the other intra-organizational factors that affect the responsiveness of SPCs to institutionally induced SCS. It is argued also that multiplicity of institutional pressures would restrict the ability of organizations to respond (Oliver, 1991: 162) to institutionally induced MA practices and impinge on how these practices are actually implemented.

The theoretical underpinnings of this research, therefore, rely on combining some important institutional elements of change cited by NIS, specifically the coercive pressures exerted by the supervisory authority on SPCs, with the other external technical (market competitive pressures) and intra-organizational (willingness and capacity) contingent conditions, which have been informed by some contingency

theory research (Otley,1987; Chenhall, 2003) to gain better understanding into the mechanisms of MA change in SPCs setting.

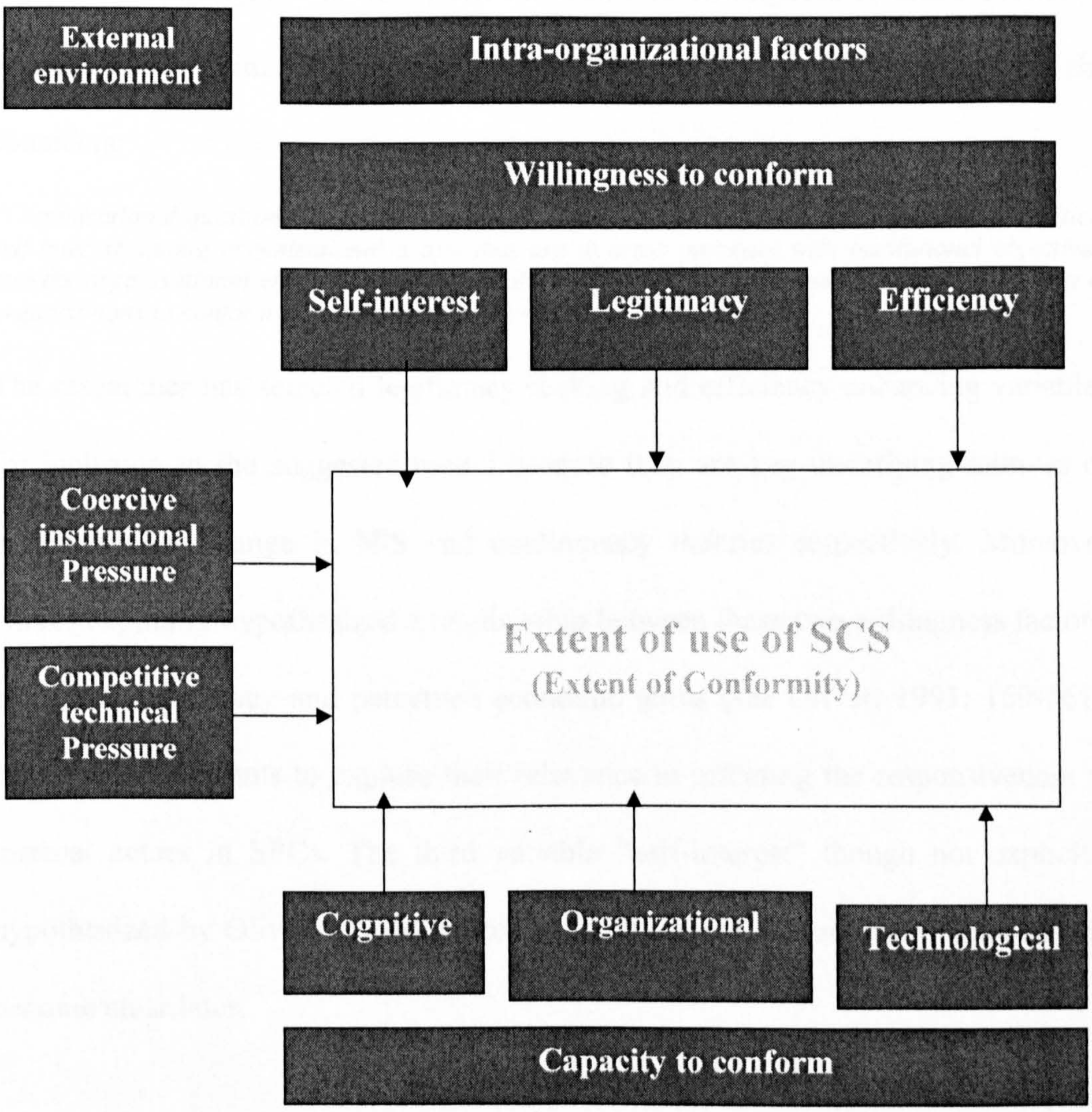
The suggested theoretical model in this research considers the internal factors as enabling conditions that affect conformity to the institutional pressures. These factors are related to the willingness and the capacity of internal actors to respond to their environmental demands.

Thus, decoupling of external pressures and internal systems is not a major issue (Modell, 2002), the main concern of this research, in addition to exploring SCS practice in SPCs and gaining insights from this practice, is the extent to which the defined intra-organizational and external coercive institutional and competitive pressure factors, are associated with the extent of use of SCS. It aims also to attend to the complexity of MA change in SPCs context by exploring how the most relevant factors combined together and in what ways in affecting conformity or resistance of SPCs to the institutional requirements.

Figure (2-2) displays the suggested theoretical framework, which shows the hypothesised relationships between the different institutional, technical and intra-organizational factors and the extent of use of SCS.

As can be seen from the Figure (2-2) factors are classified into two main groups, external, and intra-organizational. The first group relates mainly to the external environment and embodies two main variables; "Coercive institutional pressure", which reflects the supervisory authority influence, a key predictor in NIS research; and "Competitive technical pressure", which reflects the competitive or market pressure, a key aspect of the external environment in contingency based MA research.

The researcher has considered these two aspects because they seemed relevant in the case of SPCs.



The second group includes intra-organizational factors, which have been classified into two subgroups according to the two dimensions that have been hypothesised by Oliver (1991: 159) as influencing the conformity of organizations to the external pressures; namely the willingness and the capacity to conform.

The first dimension (willingness) embodies three willingness factors that have been considered as affecting the responsiveness of internal actors: desire to attain legitimacy, willingness to attain self-interest, and willingness to attain economic organizational gains. These three factors align with Oliver's typology as she considers:

> *"Organizational questions about the legitimacy or validity of the institutional status quo, political self-interest among organizational actors that are at cross purposes with institutional objectives, and the organizational efforts to retain control over processes and outputs limit the willingness of organizations to conform to institutional requirements" (1991: 159).*

The researcher has selected legitimacy seeking and efficiency enhancing variables for inclusion in the suggested model because they are key underlying motives of organizational change in NIS and contingency theories respectively. Moreover Oliver explicitly hypothesized a relationship between these two willingness factors, perceived legitimacy and perceived economic gains (see Oliver, 1991: 160-161). The researcher wants to explore their relevance in affecting the responsiveness of internal actors in SPCs. The third variable "self-interest" though not explicitly hypothesized by Oliver, has been cited in the literature as a relevant factor as will become clear later.

The second dimension of internal factors is related to the capacity to conform, which in turn includes three latent variables related to the ability of internal actors to respond to external demands.

These are the "cognitive" capacity, "organizational" capacity, and the suitability of technological "task requirements".

Again these factors correspond with some of Oliver's ideas about the factors that bound the organizational capacity. As she argues:

*"The scope conditions under which organizations are able to conform are bounded by the organizational capacity, conflict and awareness." (Oliver, 1991: 159).*

She, however, did not explicitly hypothesize the relationship between the capacity factors and the level of responsiveness, thus the researcher intends to explore their relevance in affecting SPCs responses to institutionally induced SCS. Variables included in these groups are guided also by some MA research on the adoption of ABC system, (Brown, Booth, and Giacobbe, 2004) and contingency based research (Waterhouse & Tiessen, 1981) as well as SCS literature as will be discussed later.

Thus, while the researcher is not interested in examining fully Oliver's model, her core arguments and the two dimensions of willingness and capacity to conform are maintained.

The research contributes to Oliver's theoretical framework by explicitly hypothesizing the relationship between responsiveness to institutional pressures and each of self-interest behaviour, cognitive and organizational capacity and task technology factors.

Moreover, most of the previous works treated Oliver's framework from the perspective of different strategies that companies adopt to respond to institutional pressures (See Clemens and Douglas, 2005; Ingram and Simons, 1995). The focus

of this research will be different in that it will concentrate on conformity (use of SCS) or resistance (non-use of SCS) to institutional induced SCS, and the different combinations of institutional and intra-organizational conditions under which each of these organizational behaviours might occur.

The theoretical approach adopted in this research is, therefore, consistent with the views of MA researchers, interested in contingency theory, who recognized that:

> *"Many of the insights concerning the role of institutions within society on the adoption of MCS [management control systems] can be combined readily with contingency concepts." (Chenhall, 2003: 160).*

It also responds to the calls of MA researchers, interested in the institutional approach, to further explore the interplay between institutional forces and the other intra-organizational and technical elements (Modell, 2001: 461, 2002; Tsamenyi et al, 2006: 429).

The research methodology, which is derived from the theoretical framework, the development of the research hypotheses, variable measurements and data collection strategies adopted will be discussed in the subsequent chapters.

Because of the exploratory nature of this research and the small body of knowledge available on the practice of SCS in Syria, and in order to identify the nature of these factors in each group that are likely to be associated with the extent of use of SCS in SPCs, the researcher has had to trace the development and the practice of SCS in the MA literature in general, and the available studies in Syria in particular. This in turn would arguably validate the hypothesised theoretical framework. It also facilitates the formulation of the research hypotheses, the development of the research instrument and the operationalization of each construct represented by each group of factors. The historical analysis will be discussed in the following two chapters.

# Chapter (3): The development of standard costing theory, historical lesson and critical view from the NIS perspective:

## 3-1 Introduction

Understanding the mechanism by which SCS theory has developed, and the institutional and intra-organizational factors underlying its diffusion, requires a brief search for these factors in the historical roots of the technique.

As Fleischman and Tyson noted 'many historians have theorized that the past and present are inexorably linked' (Fleischman and Tyson, 1996: 37).

This chapter traces the different institutional, technical and intra-organizational elements that have influenced the development and practice of SCS by examining the different available studies and research in the MA literature.

The literature search in this chapter will be grounded on the adjusted NIS framework discussed earlier in the previous chapter.

The historical evidence gathered has placed more emphasis on the Anglo-Saxon (UK and USA) experience because the technique has its historical roots in the MA literature in those countries.

In doing so the researcher aims to achieve two objectives. Firstly to provide a historical evidence for the interplay between institutional elements, informed by NIS, and the other intra-organizational contingencies in shaping the change towards the diffusion of this traditional MA technique. Secondly, the historical evidence will guide and facilitate the subsequent stages of the research, and render some validation to the suggested theoretical framework.

## 3-2 The development of SCS and the effect of institutional forces:

Institutionalists have considered academics 'University specialists' and professional bodies, as a main source of isomorphism, which provide legitimate norms and rules that influence the organizational behaviour (Powell and DiMaggio, 1991: 71, Zucker, 1987: 444). These two institutional forces have impinged on the development of SCS theory as the historical evidence suggests.

### 3-2–1 the role of pioneer academics and authors

The early roots of the SCS theory were found in the ideas of pioneer innovative figures, and shaped by imitation.

Many authors have seen the development of SCS as inextricably linked with the development of scientific management in the USA, and the works of F. Taylor and his colleagues around the end of 19th century (Solomons, 1968[a]; Fleischman & Tyson, 1998; Edwards *et al,* 2002).

The need to develop efficiency and simplify complex tasks to make them more manageable led Taylor to introduce his system, which relied on quantity standards for the amount of labor and material that should be used under ideal conditions (Kaplan and Atkinson, 1998).

Taylor used time and motion studies and process analysis to establish scientific standards, and it was at 'Midvale Steel Company' where his system was first worked out (Cunningham, 1911: 540).

In line with such development in the USA, there was recognition by some British authors for the idea of predetermined costs and the need for norms against which actual cost might be measured and compared.

Garcke and Fells, who published *"Factory Accounts"*, drew attention to the importance of norms or "standards". They suggested:

*"Before any order to manufacture is given it is advisable, as tending to produce greater economy in cost of production, that the person best acquainted with its processes and details should estimate the probable cost to be incurred in wages and materials, in the production of the articles in question. This estimate should be a minimum rather than a maximum one, and storekeeper having been furnished with particulars of it, should not without special authority issue more material for the order than is estimated" (Garcke and Fells, 1893: 51).*

Alexander Hamilton Church who presented in 1901 his work *'The Proper Distribution of Establishment Charges'* provides another good example of such works. Interestingly Church's ideas were convergent to those of American scholars, particularly the concentration on the scientific standards. He used this term to clarify the method that he suggested to allocate the indirect costs and asserted

*"the principle of* ***standardization*** *[Written in bold in the resource] comes into play at this point. Our charges to product are made through hourly machine rates, but these rates are standard rates, which represent the cost of running the machine for 1 hr. under standard and favorable conditions" (Church, 1917: 70).*

Another main figure that has been considered to be one of the originators of SCS is G. Charter Harrison. Harrison published in 1930 the first book in the field 'Standard costs', which received great interest in the costing literature and was regarded a turning point in the development of SCS (Batty, 1970: 48). Harrison's book '*Standard Costs*' demonstrates the author's full understanding for the mechanism of establishing and operating standard cost systems. Harrison avoided the confusion of standard costs with estimated costs, clarifying the meaning of standard costs, which he defined as 'the costs that are scientifically determined in advance' (Harrison, 1930: 4). More importantly Harrison's work signified a shift from interest in conceptualizing the SCS and setting out its advantages into the installation of this system in practice. He stated:

*"there is little, if any, need of again telling what standard costs are or the possible advantages from their use. Rather, what is now needed is a plain statement of how standard costs are set up, how standard cost systems are installed and operated, how actual costs are checked against the standards, and how the advantages from such systems are practically secured" (Harrison, 1930: 3).*

He specified the advantages of standard costs and thought that they furnish a guide to obtain desired profits, they give a basis for establishing proper selling price (decision making), they reveal the variations from standards and their causes (control), they provide concise summary reports for every executive showing the results of the section or department (performance evaluation), and predicting results that are attainable a reasonable time in advance (planning) (Harrison, 1930: iv). Another virtue of Harrison's work was that he provided the first set of formulas, and this in turn made it possible to calculate and analyze cost variances.

A key question for an investigation into the development and diffusion of standard costing in different countries concerns the mechanism for transferring developments in the U.S to the UK. The answer lies in fact that some pioneer authors had the opportunity to live in both countries. There was a mutual influence between authors from the two countries.

According to Solomons, 'Credit for the earliest detailed description of a system of standard costing has been given to the American, John Whitmore'(1968[a]: 37), who gave his description of standard costing in a lecture before New York University School of Commerce in 1908. Before this lecture, however, and in two previous lectures given by Whitmore in 1905-1906, he did not refer to standard costs in the acceptable logic, but he did discuss Church's supplementary rate. Solomons thought:

*"it would seem that some of his [Whitmore] more developed ideas stem direct from Hamilton Church, to whom, therefore, some of the credit for the development of the idea of standard costs must go"* (1968[a]: 39).

Church had himself moved from the UK to the United States about 1900 where he wrote and worked for the most part of his 1901 book (Garner, 1976: 129).

Further evidence of the interaction between developments in the UK and USA can be found in the work of Harrison who had the opportunity to settle in the USA from 1911 to 1916 so he could view the developments and the key issues relating to this new costing method in the USA where it was attracting attention from both authors and professional institutes. He was particularly affected by the works of Harrington Emerson, and acknowledged that:

> *"the first printed references the author has been able to find to standard costs were those embodied in Harrington Emerson's book, Efficiency as a basis for operation and wages" (Harrison, 1930: 11).*

In 1911 he developed Emerson's ideas into the first complete standard costs system to exist at that time. This was for the *Boss Manufacturing Co.*, of Kewanee, Illinois, a maker of work gloves in the USA (Solomons, 1968[a]: 46).

Evidently, therefore, there was a mimetic mechanism by which the ideas related to this traditional MA technique were dispersed.

The literature of SCS shows that author beliefs about SCS might contribute to a general ideology that prescribed SCS as a good and useful practice during the early stages of its development. Such ideology is expected to influence the behavior of early adopters who might be seeking to enhance the efficiency or to achieve more control over the workforce in their organizations.

Institutionalists have acknowledged that enhancing performance might be the main incentive for change in the early stages of development of organizational practices (Powell and DiMaggio, 1991: 66).

Interestingly Harrison, perceptively, recognized and described the tendency towards imitation among the manufacturers at that time, and wrote:

*"in many cases the manufacturer had cautiously waited before introducing cost methods into his factory until he could see the results of cost experiments in a neighboring factory" (Harrison, 1930: 4).*

Authors' beliefs concerning the usefulness of SCS have constructed a suitable base for further development in the SCS theory and practice.

### 3-2-2 The role of professional accounting bodies:

Professional bodies are another powerful external institutional force that is likely to cause homogenization in MA practices within a certain organizational field.

According to NIS supporters

*"Two aspects of professionalization are important sources of isomorphism. One is the resting of formal education and of legitimation in a cognitive base produced by university specialists; the second is the growth and elaboration of professional networks that span organizations and across which new models diffuse rapidly" (DiMaggio and Powell, 1983: 152).*

MA literature shows that the development of SCS has been largely influenced by the constructive role that has been played by the accounting professional bodies.

In the UK, the Institute of Cost and Works Accountants (ICWA) (now known as the Chartered Institute of Management Accountants CIMA) was the national organization that promoted and sponsored cost accounting in Great Britain in the early twentieth century. It was organized in 1919, in the aftermath of the First World War, and represented cost accountants in the UK (Noble, 1929).

Early interest was shown by the ICWA in SCS and it played a pioneer role in creating and promoting standard costing theory through articles, conferences and lectures organized in its different branches throughout the UK. As Batty noted, in the 1920s 'the I.C.W.A. was giving recognition to standard costing' (1970: 47).

Several conferences and a considerable number of articles on the topic were organized by the ICWA during the first half of the last century (see Batty 1970:

48-55). Such conferences aimed mainly to clarify the new technique and encourage its application.

For example, in 1923, R. Stelling addressed a public meeting of the ICWA branch in Sheffield on 'standard costs with particular reference to the Sheffield industries'. He asserted that the application of standard costs would be appropriate for dealing with the managerial problems connected with steel melting and rolling as well as the manufacture of cutlery (Batty, 1970: 48).

Many authors have acknowledged the important role of the professional bodies in promoting SCS theory, in the recent MA literature. According to Fleischman and Tyson, 'Academic and professional organizations actively promoted standard costing during the first two- thirds of the 20th century' (1996: 46). The authors have acknowledged the role of the ICWA in addressing the different issues related to cost and MA in its journal, *'The Cost Accountant'* (1996: 46).

The Institute of Chartered Accountants in England and Wales (ICAEW) also 'devoted a considerable part of its memorandum to standard costing and budgetary control' (Edwards *et al*, 2002: 36).

Similarly, Fleischman and Tyson have referred to the interest shown by National Association of Cost Accountants (NACA) in the USA, which considered that 'the accountant's role in cost control occurred particularly through the preparation of standard cost reports' (1996: 46).

Such notable interest expressed by professional networks in promoting SCS theory is expected to induce social beliefs and myths pertaining to the usefulness of SCS, which should, according to the NIS, spread across the organizational field and provoke homogenization (DiMaggio and Powell, 1983).

### 3-2- 3- Inadequacy of the external institutional forces:

It follows from the discussions in the previous sections that the normative forces cited by institutionalists played a vital role in crystallizing SCS theory. Such forces also created an atmosphere of ideological thought and norms that could influence the organizational behavior and support the diffusion of SCS.

The dispersion of SCS as an institutionally induced MA practice, however, seems not as straightforward as the institutional model prescribes the change in the organizational structures.

These voluntary rules and ideologies, as the SCS literature in the UK shows, appear to be not sufficient alone to create the isomorphic change towards SCS in the first half of the 20th century.

The absence of significant evidence for the extent of use in the UK in the period of 1930s- 1950s enhances this observation. Moreover, the literature of SCS in this country reveals that SCS was relatively overlooked during the above mentioned period, and the practice seems not well documented (See Lawrence and Humphreys, 1947: 34; Batty, 1970; Scapens, 1985: 16; Ashton, Hopper and Scapens, 1991: 2).

Batty, for example, has acknowledged that 'interest in standard costing was somewhat diminished by the Second World War' (Batty, 1970: 55).

Scapens has asserted:

> *"although standard costing and the budgetary control had been developed in the early decades of the twentieth century it was in the late 1950s and early 1960s that responsibility accounting developed rapidly in the vanguard advances in the management accounting" (1985: 16).*

Edwards *et al* (2002), more recently, have found that the adoption of standard costing and budgetary control started at USC (United Steel Companies Ltd) in about 1930. However, the authors have acknowledged that 'there is no evidence

presently available of its use by any other leading company in the iron and steel industry for another 25 years or so' (Edwards *et al*, 2002: 27).

The following table quoted in Edwards *et al*, (2002: 27) presents the names of the companies covered by their paper and the dates when these companies in whole or in part adopted SCS and budgetary control.

As can be seen from table (3-1), and according to Edwards *et al*, only one company (USC) in their sample of the largest iron and steel companies adopted SCS in the first half of the 20th century, while most of the other companies in this sample introduced this technique in the 1960s.

**Table (3-1) known dates of the adoption of standard costing and/or budgetary control in the UK iron and steel industry. (Quoted in Edwards *et al*, 2002: 27)**

| *Company* | *Budgetary control* | *Standard costing* |
|---|---|---|
| USC | 1930 | 1930 |
| Round Oak | by1964 | 1957 |
| Stewart & Lloyds | 1961 | c.1961 |
| GKN | 1963 | 1963 |
| Lancashire steel | not known | by1965/6 |
| RTB | not known | 1961 |
| Whitehead's | not known | by1968 |
| Colvilles | 1967 | not known |

It is not clear, however, from the available UK MA literature, the factors that caused this low diffusion of SCS at this period. Two main factors of significant implications for the adopted theoretical framework can be seen in the literature; the organizations' suspicion about the economic gains that can be derived from adopting SCS, which has been considered too expensive to operate (Harrison, 1930: 4; Walker, 1980: 180); and the resistance shown from other internal actors, such as organized labor, who see the new system at cross purposes with their own self-interest (Fleischman, 2000: 610).

Whatever the reasons of this low dispersion in the UK, during the first half of 20th century, despite the voluntary institutional environment of academic and professional supportive attitudes, it seems that other certain intra-organizational and technical factors, which have been dropped by NIS, are equally essential to cause a change.

### 3-2- 4: The institutional forces and the diffusion of SCS:

The last three decades of the 20th century saw a widespread diffusion of SCS in different countries and the institutional flavor of such change can be found in the SCS literature.

In the UK, for example, the second half of the last century saw an aggregative interest in SCS by different institutional actors. Professional bodies, academics, and trade associations, all renewed their interest in the technique and the tendency towards imitation and normative practices proceeded.

A plain example of such interest is that a team of industrial accountants from the UK was formed in order to visit USA to investigate, how accounting information assisted American management in achieving high productivity. The team was sponsored by the trade associations with financial support from the main accounting professional bodies such as ICAEW and ICWA. The team surveyed 60 US companies, which represented the different industries in the USA (Anglo-American Council of Productivity AACP, 1950: 2).They found that the majority of the investigated USA companies use SCS and this led them to suggest that, in the UK companies, 'top management should make use of standards of performance ----- and those standards should be agreed by those who are to work to them' (AACP, 1950: 16).

The involvement of the professional bodies and some tax authorities (Inland Revenue) in the 1950s 1970s costing debate, namely absorption vs. direct costing has been documented in the UK MA literature (see Dugdale & Jones, 2003). The disputation that attracted different constituents in the organizational environment matured in 1975 by the issue of *Statement of Standard Accounting Practice No.9: Stocks and Work in Progress* (SSAP9). This accounting standard favored the use of absorption costing for stock valuation. This in turn might inspire the potential impact of these institutional rules on the types of SCS, which could give more impetus to the use of absorption standard costing for the purpose of evaluating the stock.

In the 1960s, trade associations in some British industries also displayed special interest in encouraging their members to adopt SCS. For example Edwards *et al*, referred to the case of British Iron and Steel Federation (BISF)'s 1967 uniform costing scheme where the adoption of SCS was recommended (2002: 22-24). Another example can be found in the "Standard System of Catering Accounting" where the Economic Development Committee (EDC) provided the members of the catering industry with a full discussion of unified standard costing. Sir William Swallow, chairman of Hotel and catering EDC encouraged the members to adopt SCS insisting that

> *"A system of accounts is of no value unless it is widely used. The next step is for the trade associations and the large catering concerns in the industry to move as quickly as possible towards the adoption of this new system."* (Economic Development Committee for Hotels and Catering, 1971: v)

Academic interest, on the other hand was reflected in their concern in examining the diffusion of SCS. The results of the early surveys that tried to depict the use of SCS in the UK, however, seem confusing. Two early surveys the researcher was able to find. The first conducted by Perrin in 1959 who found 'twelve companies

(out of 30) possessing standard costing systems integrated with their double-entry records' (Perrin, 1959: 57).The second was conducted by Goodlad in 1965, who noted that only (12%) of the (25) companies surveyed use SCS (Goodlad, 1965: 18).

The explicit difference in the extent of use reported by the two surveys can be ascribed mainly to the differences in the sizes of the companies embodied in each study. While Perrin concentrated on large companies, Goodlad's survey was based on small companies (Perrin 1959; Goodlad, 1965).

The cumulative interest, therefore, by the different external institutional constituents might be expected to provoke further development in the practice of SCS. Moreover, the technological changes around the 1970s might have an integral effect on causing the isomorphic change towards the use of SCS.

Studies in the UK starting from 1970s have shown persistent and widespread use of SCS.

Table (3-2) portrays some of the surveys that the researcher could find on the practice of SCS in the UK and the documented rate of diffusion.

**Table (3-2) the known surveys on (SCS) in the UK**

| The author(s) | Date of publication | Number of companies surveyed | Rate of use |
|---|---|---|---|
| Perrin, J.R. | 1959 | 30 | 40% |
| Goodlad | 1965 | 25 | 12% |
| Batty | **1970** | **65** | **51%** |
| Puxty & Lyall | 1989 | 453 | 76% |
| Drury *et al* | 1993 | 303 | 76% |
| Dugdale *et al* | 2006 | 41 | 70% |

As can be seen from the table (3-2) it seems that around 1970 SCS started to achieve considerable acceptance in practice, while professional bodies and academics were giving more support to its application.

This according to the institutionalists will lead to the isomorphic change because the majority of organizations will seek to adopt these normative rules to maintain the appearance of legitimacy and social approval (Oliver, 1997: 100).

The relatively stable rate of use documented by the studies from 1989 to 2003 appears to sustain the NIS premise, which interpret such wide use of SCS by looking to this practice as rules that are 'taken for granted or may be supported by public opinion' (Meyer, and Rowan, 1977: 341 cited). The relative stability in the use of SCS seems additionally to support the institutionalists assumption, which does not only 'emphasize the homogeneity of the organizations; it also tends to stress the stability of institutionalized components' (Powell and DiMaggio, 1991: 14).

Other external factors may have interacted with institutional forces and caused this isomorphism. It has been argued that:

> *"prior to the 1980s many organizations in western countries operated in a protected competitive environment ------ there was little incentive for firms to maximize efficiency and improve management practices, or minimize costs as cost increases could be passed to customers" (Drury, 2000: 10).*

The more competitive environment may, therefore, be another external factor that affected the use of SCS.

Studies in other countries have shown, similarly, a wide use of SCS in the last two decades of the last century. In the USA, for example, surveys by Cress and Pettijohn (1985) and Fry *et al* (1998) found (85%), (75%) rates of use respectively. In New Zealand Guilding *et al* (1998) has documented (73%) usage rate. In India Joshi (2001) has reported (68%) rate.

This wide diffusion of SCS seems persistent despite the change in ideology, starting from the mid 1980s, and the intensive criticisms by authors, who predicted the demise of SCS and questioned its usefulness in the conditions of the new manufacturing environment (Ferrara, 1995: 34; Fry et al 1997; Howell; 1987; Johnson and Kaplan, 1991; Monden and Lee, 1993). It was argued by some authors that, to prosper in today's competitive environment, companies should focus on issues such as improving quality, increasing flexibility to meet customers' requirements, reducing inventory and product costs (Lucas, 1997:32). SCS, however, was blamed as being counter-productive in such environments by encouraging dysfunctional behaviour (Ferrara, 1995; Lucas, 1997; Sulaiman, et al, 2005: 110). For example SCS might encourage purchasing managers to purchase massive quantities in order to obtain discounts and thus favourable material price variance, which in turn contrasts with JIT philosophy (Lucas, 1997:32).

The widespread use of SCS and its persistence and relatively constant use, in spite of the disapproval shown by some authors and their allegations concerning the incompatibility of the technique with the conditions of new manufacturing and competitive environments, undermines some of the core foundations of the profit maximization approach, which assume the rational behavior of internal actors. This observation might also sustain the institutional explanations of MA change.

All in all, the influence of the voluntary normative and mimetic institutional forces seems evident in the SCS literature particularly in the UK. Most obvious was the effect of professional bodies, academics, and uncertainty that was reflected through the tendency towards imitation, while no evidence could be found for a

potential impact of coercive pressure. Researchers have also cited competition as an incentive for accounting change.

Obviously, the historical evidence discussed in this chapter so far may lend support to the NIS. However, the period of low development in the UK and the low diffusion until around 1970 reveal that other technological and intra-organizational contingencies might have also essential role in the accounting change. The literature of SCS has referred to the influence of some intra-organizational contingencies and will be examined in the next section.

## 3-3 SCS diffusion and the influence of the other intra-organizational and task related factors:

As mentioned above, the effect of voluntary institutional forces on the use of SCS seems evident in the UK MA literature. However, the concentration on the institutional elements per se cannot provide sufficient interpretation of this accounting change.

The delayed diffusion of the technique, comparing to the early historical institutional roots, questions the premises of NIS and enhances the beliefs of some MA researchers that such accounting change cannot be only attributed to the institutional forces (Major and Hooper, 2003; Modell, 2001, 2002; Tsamenyi *et al* 2006). This in turn stimulates the question pertaining to the other intra-organizational factors that might have contributed to the diffusion of SCS. The two intra-organizational dimensions suggested by Oliver (1991: 159) as possible predictors of responsiveness to institutional demands will direct the literature search at this stage. The first dimension is related to the capacity of organizations to respond to institutional requirements and embodies elements that are related to

the awareness, the availability of resources and the technological requirements associated with the use of SCS. The second dimension relates to the willingness of organizations to respond to external expectations; that is the motives and the elements that affect the expected benefits perceived by internal actors from using SCS.

It should be noted also that the major aim of this historical analysis is, to help in identifying the different institutional, technical and the other intra-organizational contingencies that have affected the development and practice of SCS theory. These factors will be combined with the other elements and conditions that characterized the introduction of SCS into SPCs and will form a base for operationalizing the main constructs shown in the suggested theoretical framework. The historical evidence will also lend some support and validation for the suggested theoretical framework.

The following subsections will examine the historical evidence cited in the SCS literature concerning the potential influence of intra-organizational factors on the adoption of SCS.

### 3-3-1 SCS and the influence of intra-organizational capacity factors:

In order to respond to external institutional norms and social expectations, organizations need sufficient capacity, which in turn is bounded by certain internal factors.

Studies in the UK, and some other developed and developing countries have referred to the influence of the availability of sufficient organizational capabilities and resources, the knowledge and awareness of the main actors within the

organization, and the suitability of technological task requirements on the change towards SCS, and the other MA practices.

### 3-3-1-1 SCS and the availability of sufficient organizational and managerial capabilities and resources:

The availability of sufficient managerial and organizational capabilities and resources seem to have a potential effect on the diffusion of SCS as the historical evidence suggests.

In the UK, Edwards *et al* cited the case of Whitehead Iron and Steel Company Ltd in 1963 where the company 'looked to introduce standard costing but, according to Kenneth Stamp, there was considerable opposition from its general manager, Albert Blackburn, FCA, who was "rather traditionalist in relation to accounting matters".' (Edwards *et al,* 2002: 31).

Educated managers, who feel the need and have the ability to provoke the change in the accounting techniques, might be one of the main internal factors that have affected the isomorphic change towards SCS in the UK.

According to Edwards *et al*, in addition to the foundation of professional management bodies and considerable concern about management education and training in Britain, 'There was a renewed impetus for management education, after the Second World War' (Edwards *et al*, 2002: 32) , which might contribute to the dissemination of SCS in the steel industry in this country.

Without sufficient managerial capabilities and well-qualified management that should be aware of the importance of the new accounting techniques, any accounting change will be deficient. Rules and myths, whether they are coercive

or voluntary, may not be sufficient to create a change; it is essential that managers, as internal actors, respond to them.

Some authors have had the belief that the persistent use of traditional SCS in the new manufacturing environment conditions is probably linked to the managers who 'continue to demand traditional standards based reports'( Puxty and Lyall, 1989: 11).

In the USA Fry *et al* have shared this conviction and have interpreted the mismatch they have found between the characteristics of the manufacturing environment and the existence of SCS as it is probably because 'operation managers do not clearly understand the problems associated with the use of standard costing in environments not suited to such use' (Fry *et al*, 1998: 511).

In some less developed countries the lack of change in the MA practices has been attributed to 'management inertia' (Waweru *et al*, 2004: 690).

Furthermore, other organizational capabilities have been cited in the literature as affecting the use of SCS. Batty, for example, has thought that establishing and operating SCS require high level of co-operation between the related staff at the different managerial levels, such as salesmen, purchasing agents, technical engineers, accountants and the other related staff (1970: 49).

Some authors have also noted that setting standards and operating traditional standard costing systems needs, in addition to the scientific knowledge about the process, 'highly trained engineers and middle to upper levels of management' (Kaplan & Cooper, 1998: 38). Others linked the adoption of the innovative practices with the size of the firms as large firms usually have more access to the required resources (Guilding *et al*, 1998).

The SCS literature shows also some indications for a linkage between computerization and SCS, which might inspire a potential effect of this capacity factor on the diffusion of the technique. Although there were some difficulties in computerizing accounting systems (Edwards *et al*, 2002: 33), the prevailing belief was that computerization gave impetus to the accounting systems (Matz, Curry, Usry, 1972: 82).

It seems that the early applications of computer in business domain especially MRP systems, relied on engineering standards and SCS tools. For example, the main input in the MRP systems, in addition to the production schedule, is the product structure file (Bill of material BOM) (Orlicky, 1975: 52).

Similarly, in defining the direct material standards, documentation is used to show in detail the materials to be used, their code numbers, and their descriptions. 'The form used to summarize the information is known as a Standard Material Specification, Bill of Material or similar description' (Batty, 1974: 211-212).

Batty provided survey evidence for a link between SCS and computerization and has found that one of the reasons why companies used SCS was because it could facilitate the use of computers (Batty 1970: 158).

Puxty and Lyall presented further evidence for the influence of computerization and thought that, among other factors, 'More significant was the impact of information technology on standard costing' (Puxty and Lyall 1989: 34).

Computerization allowed companies to overcome the problem of timeliness of SCS information (Kaplan and Cooper, 1998) and enabled managers to calculate many different variances and present them in various ways (Hirsch, 2000: 348).

It follows from the literature that the availability of good management and sufficient organizational capabilities and resources, which would make organizations more capable to respond to their environment, might be one of the factors, which probably combined with other institutional elements in affecting the adoption of SCS.

**3-3-1-2 SCS and the influence of cognitive capacity:**

In order to accede to institutional expectations organizations need to have sufficient knowledge about the practice being defused. Evidence in the SCS literature revealed that the dissemination of SCS within some UK industries (such as Iron and steel) floundered in the early stages because such endeavors were not accompanied with sufficient management training in the use of and benefits of SCS (Edwards, Boyns and Matthews, 2002: 33).

Different related staff, particularly accountants, needs to acquire sufficient knowledge about the technique to make its adoption possible. According to some institutionalists the lack of knowledge and understanding of institutional expectations makes organizations unable to adhere to the institutional requirements (Oliver, 1991: 159).

The accountant is the person who realizes the need of management for more informative accounting techniques; the person who will contribute to installing the system and should be able to operate it; the person who can convince the managers and provide consultancy pertaining to changing accounting systems.

Professional personnel (qualified accountants), as has been earlier mentioned, are expected to transfer their professional knowledge and myths to their work place,

and have been considered by institutionalists as contributing to the isomorphism (DiMaggio and Powell, 1983; Oliver, 1991; Carruthers, 1995).

Several authors have acknowledged the main role played by skilled accountants in supporting the use of SCS.

In the UK, for example, Edwards *et al* argue that the most significant factor that contributed to the wide adoption of (SCS) in the steel industry, in the 1950s and 1960s, was probably the increasing role of professional accountants and their participation in managerial matters (2002: 35).

In the US Fry *et al* (1998: 511) also thought that the lasting use of SCS in unsuitable environments might be because the accountants did not realize the necessity of matching the accounting systems with the environment.

More recently, in South Africa, Waweru *et al* (2004: 690) have had the belief that the lack of skilled accountants is one of the prohibitors of change.

Studies have shown also that job performance is influenced by the cognitive capabilities that enable individuals to perform a task effectively (Blumberg & Pringle, 1982: 563; Nouri and Parker, 1998: 470).

It can be concluded that acquiring sufficient cognitive capabilities, namely sufficient knowledge and familiarity with MA techniques, by both accountants and related managerial staff are probably prerequisites of MA change (Burns and Vaivio, 2001: 396; Burns and Scapens, 2000: 17).

Thus, for the institutionally induced SCS to be dispersed, whatever the institutional force that has affected it, it is may be necessary that the internal actors acquire sufficient cognitive capabilities about the system. That is the isomorphic change towards the use of SCS, in response to the institutional pressures, is dependent upon the familiarity of the accounting staff and their knowledge of the system.

**3-3-1-3 SCS and the influence of the suitability of task technological requirements:**

Organizational capacity to comply with institutional demands might be reliant upon the compatibility of the technological characteristics of the processes of the organization concerned, with the so-called technological requirements for using SCS.

MA literature has cited some technological conditions, which were considered as most suitable for the use of SCS (Fray *et al*, 1998: 507).

Arguments cited in the literature regarding the technological requirements of applying SCS can be summarized as follows:

- SCS is considered most suitable for manufacturing firms (Drury, 1998; Drury, 2004).
- SCS is convenient in those organizations whose activities consist of a series of common or repetitive operations and continuous flow of work processes (Drury, 1998; Drury, 2004; Kaplan and Cooper, 1998). It is, therefore, often found in the organizations that use process systems (Davidson *et al*, 1988: 126).

- Advanced manufacturing technology has been considered as one of the technological factors affecting the usefulness of SCS (Fry *et al,* 1998; Drury, 2004). Increasing the extent of automation will change the cost structure and, will reflect its effect on the suitability of SCS (Bromwich and Bhimani, 1989: 49).
- Standard costing is suitable for organizations where input required to produce each unit of out put can be specified (Drury, 2000: 672).

It can be said, therefore, that the suitability of the task technological requirements might interact with the other institutional factors and enhance the dispersion of SCS. Organizations with technological characteristics different from the supposed requirements suitable for the use of SCS might be less able to adopt SCS.

### 3-3-2 SCS and the influence of Willingness related factors:

Having the capacity to respond to institutional environment pressures is probably not sufficient to cause isomorphic change. It is important, also that organizations perceive the institutional rules as serving their self-interest and consider conformity beneficial to them (See Oliver, 1991).

Organizations might have different motives for using SCS, which would affect their conformity to the ideologies that suggested the use of SCS.

#### 3-3-2-1 SCS and serving the organizations' objectives to attain economic gains

The positive ideology that prevailed until around the closing decades of the last century, which highlighted the great benefits that organizations could gain from

the application of SCS, might motivate the willingness of organizations to adopt the technique.

Many authors have referred to the different purposes that SCS can serve (see Harrison, 1930; Batty, 1970; Davidson *et al* 1988; Drury, 2000, 2004; Drury *et al* 1993; Guilding *et al,* 1998).

The following are some of these purposes:

- Setting budgets.
- Evaluating managerial performance.
- Managerial control.
- Decision-making (particularly price setting).
- Simplify product costing for inventory evaluation.
- Motivating individuals.
- Facilitating bookkeeping/ data processing economies.

The multiplicity of purposes which SCS could serve might be one of the reasons for the lasting use of the technique despite the hostility shown by some critics, who predicted its obsolescence. SCS, therefore, seems to still have economic gains to render to organizations (Sulaiman *et al*, 2004: 121).

### 3-3-2-2 SCS should serve the interest of main actors

Willingness to conform to expectations might be affected also by the self-interest of the internal actors.

The historical evidence in the UK MA literature suggests that, the resistance shown from other internal actors, such as organized labor, who see the new system

as contrary to their own self-interest might contribute to the failure of early attempts to use SCS. According to Fleischman:

*"The negative reaction of labour, particularly organized labour, may have been a contributing factor to the failure of Taylorism to achieve prominence in practice commensurate with its theoretical significance" (2000: 610).*

Puxty and Lyall have reflected the conviction by some authors that the lasting use of SCS lies in the fact that the systems are 'championed by accountants because by setting standards and calculating variances they become indispensable and powerful' (Puxty and Lyall, 1989: 11).

Authors also have referred to the need to motivate those who will work with standards of performance, (Otley 1987: 28) and how the types of standards used might impinge on managers' behavior, who will 'accept the standards as being tough, but not unreasonable, goals' (Horngren and Sundem, 1990: 216).

The perceived self-interest of the main actors is, therefore, a possible factor that might affect the isomorphic change towards the use of SCS.

Setting unreasonable standards and lack of personal motivation would be seen as odds with internal actors' self-interest, which would cause resistance to the adoption of SCS (Oliver, 1991: 159).

**3-3-2-3 SCS and the impact of legitimating behavior of internal actors:**

Another incentive, which might contribute to the wide use of SCS, could be the organizations' concern of maintaining legitimating appearance in the eyes of institutional constituents. The wide use of SCS, which started in the UK in the 1960s and 1970s, and then the lasting use of the technique, despite the intense criticisms, might lie in the fact that in addition to its economic benefits the system renders the organizations' legitimation by responding to the recommendations of

professional accounting institutes and meeting the requirements of standard setting bodies.

For example one of the professional recommendations related to the evaluation of stock in the UK is Statement of Standard Accounting Practice number 9 (SSAP9). This standard considers standard cost an acceptable base for valuing stock for the purpose of external financial reporting, although it requires that where standard costs are used they must be reviewed frequently to ensure that they bear a reasonable relationship to actual costs (Wilkins, 2001: 147; Blake and Lunt, 2001: 185).

This view from professional bodies would give legitimation to companies that adopted SCS as a base for valuing inventory; this in turn might be one of the incentives, which contributed to the widespread use of SCS. That is, in addition to its potential economic gains in exercising control over cost elements and helping managerial control and decision making, standard cost could help its adopters to cope with professional accounting requirements for financial reporting.

This view might be supported by survey evidence in different countries, which have shown a heavy reliance on using SCS for valuing stocks (Drury *et al*, 1993: 35; Sulaiman *et al*, 2004: 115).

## 3-4 Summary of chapter (3):

This chapter has traced the development of SCS theory from the NIS perspective. SCS literature, particularly in the UK, shows that certain institutional dynamics such as, professional bodies, academics attitudes, and the other social bodies have constituted a general ideology that prescribed SCS as a good practice at least during the fist seven decades of the last century. Uncertainty and the desire to improve efficiency might shape the development by imitation, where the ideas and practices have been transferred mutually between the US and the UK.

Though the historical evidence apparently supports the NIS perspective (Meyer & Rowan 1977; DiMaggio and Powell, 1983), the review reveals that institutional forces were probably not sufficient to provoke the isomorphic change in such a deterministic way as that described by the institutionalists. Certain intra-organizational and technical factors, such as, the availability of skilled accountants and the acquisition of sufficient cognitive capabilities by accountants and the other related staff, the availability of sufficient organizational capabilities and well educated mangers, computerization and the other intra-organizational capabilities, seem to be considerable influences.

The SCS literature tells us also that there might be different motives, which combined with the other intra-organizational and extra organizational institutional factors to provoke the diffusion of this traditional MA system.

These observations in the literature seem to enhance the new theoretical approach and support the argument that the responsiveness of the organizations to institutional pressures is dependent upon the type of the pressures and the capacity

and willingness of organizations to respond to institutional rules (Oliver, 1991: 159).

The lesson, which can be learnt from the historical evidence, is that change in the MA system, like other social phenomena, is complicated, as it might be impossible for one of the available approaches in the discipline to explain such complexity. Neither contingency nor institutional theories could alone provide sufficient explanations for the conditions that govern changes in the MA techniques. This review provides an understanding for the conditions that affected the development of SCS theory and will guide the investigation of the institutional and the technical and organizational factors that governed the development of SCS in SPCs. The next chapter considers these conditions.

# Chapter (4): The development of SCS and costing methods in SPCs- institutional perspective:

This chapter examines the development of SCS and the costing methods in SPCs. It aims to identify the different institutional, intra-organizational and technical conditions under which standard costing have evolved in Syria. Bearing in mind the factors that governed the development of SCS theory, which have been discussed so far, this chapter proceeds by looking for the institutional, technical and intra-organizational peculiarities that characterized the introduction of SCS into SPCs context.

Hence, the review starts with providing a historical background of the socioeconomic conditions surrounding the development of pubic sector and its importance in the Syrian economy. This will be followed by an institutional analysis of the coercive forces and their potential effect on the development of SCS and the other costing and accounting practices in Syria. Then, SCS theory and the role of the other voluntary institutional factors will be considered; following that the other intra-organizational factors that might affect the capacity and the willingness of the internal actors within the SPCs to conform to the institutional pressures will be outlined.

## 4-1 Early socioeconomic antecedents and the importance of public sector in Syrian economy

The history of Syria was shaped by instability during the first 7 decades of the 20th century. In early 1920, French troops landed on the Syrian coast, (See http://www.damascus-online.com/history/brief.htm, 2005) beginning a period of occupation, which lasted for about a quarter of a century. After this country had its

independence in 1946 and until 1963 the period was characterized by the dominance of a less developed agricultural economy with a very few textile mills and some handcrafts (http://print.infoplease.com/ce6/world/A0861412.html, 2005).

In 1963 there was the 8th of March revolution and with it came the nationalization movements, which represented a turning point in the economic, political and social life of the country. Through the complete and partial nationalization of the few large and medium size enterprises, the state created the nucleus of the public industrial sector in January 1965 (http://reference.allrefer.com/country-guide-study/syria/syria72.html, 2006). However, the subsequent period until 1970 saw political instability, which in turn affected the development process that commenced in 1963.

Starting from 1970 and as a result of the "*Corrective Movement*", which was seen as a turning point in the new history of this country, Syria started to enjoy political stability (see http://www.damascus-online.com/history/brief.htm, 2005) that reflected its positive effects on the different fields. This movement enhanced the socialism style of the society, through completing the nationalization process that began in 1963, and in 1970 the semipublic firms were fully nationalized (http://reference.allrefer.com/country-guide-study/syria/syria72.html, 2006).

The 1970s saw great interest by the government in developing the public sector and giving it priority in the development process. The majority of the SPCs were

located under the Ministry of Industry and organized under the following organizations[2] (Abu-Dan, 2004: 1)

- General Organization for Chemical Industries.
- General Organization for Engineering Industries.
- General Organization for Textile Industries.
- General Organization for Sugar.
- General Organization for Food Industries.
- General Organization for Cement.

Separate ministries controlled the national electric power and the petroleum companies.

The decree no 18 (1974: 5), defines the public company as 'A public entity, which enjoys financial and managerial autonomy and contributes to the development of social national economy, and consist of one or several economic units which practice an agricultural, industrial, commercial or financial activity.'

The decree no 18 gives the general organization a supervisory role and defines it as 'A public entity, which enjoys financial and managerial autonomy and contributes to the development of social national economy, and engages in an economic activity either by directly practicing such activity, or through supervising and coordinating a number of public companies that share similar objectives' (1974: 5).

Figure (4-1) illustrates the direct authority relationships between SPCs and the different institutional supervisory authorities.

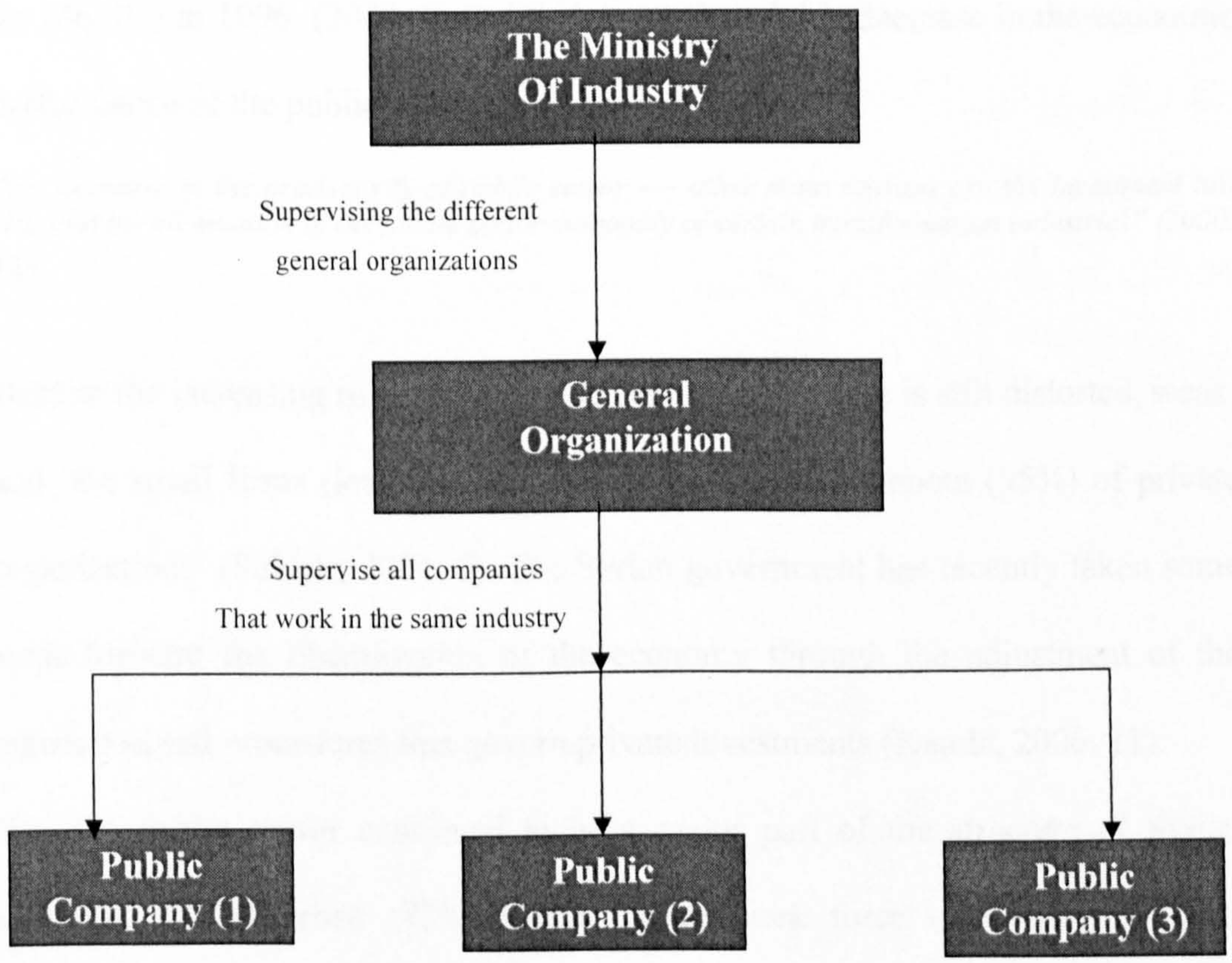
[2] Added to those organizations the general organization of tobacco in 2003, which was previously under the supervision of the Ministry of Economy and Foreign Trade.

As figure (4-1) shows, SPCs that engage in similar or integral economic activities are linked to, and supervised by, a public entity: general organization.

The Ministry of Industry in turn supervises general organizations in the industrial sector.

Regulations have insisted also that SPCs practice economic activity under the government's guarantee and protection (Decree no 18, 1974 adjusted by the Decree no2, 2005 rule 21). Hence, the public sector enjoyed the central authority's protection.

**Figure (4-1) the hierarchal direct authority relationship between SPCs and the different institutional constituents**



Government's interest in prioritizing the role of the public sector in leading the development process meant this sector dominated the main industries. The proportion of public sector's contribution to the total national industrial production amounted to (73%) in 1985 (Dalilla, 2000: 9).

In the 1980s government policy towards the private sector changed and the new policy aimed to encourage the involvement of this sector in the development process. This intention matured in 1991 by the issue of the investment law (No 10).

According to Dalilla the contribution of the public sector to the total national industrial production had fallen to (53.5%) while the private sector now accounted for (46.5%) in 1996. (2000: 9) Dalilla has attributed this decrease in the economic performance of the public sector to

*"the decrease in the productivity of public sector ---- other main reasons are the investment law (10) and the elimination of the public sector monopoly of certain transformation industries" (2000: 10).*

Despite the increasing role of the private sector its structure is still distorted, weak, and 'the small firms (less than ten employees) constitute about (95%) of private organizations' (Sukkar, 2004: 6). The Syrian government has recently taken some steps forward the liberalization of the economy through the adjustment of the legislation and procedures that govern private investments (Kamla, 2006: 11).

Yet, the public sector continued to be a major part of the structure of Syrian economy and absorbed '73% of the Syrian work force' (AL- Sayed, 2001, Abstract). However, the performance of the SPCs has been recently under intensive criticism by commentators who theorized that this sector needs

administrative reform and rehabilitation (Mreiden, 2002; Abu-Sekkeh, 2004; AL-Sayed, 2001; Salama, 2000; Sukkar, 2004).

The increasing role of the private sector starting from mid 1980s, particularly following the endorsement of investment law 10 (Dalilla, 2000: 10), the tendency towards eliminating the barriers between the Syrian market and the other Arab and international markets (EU) (Salama, 2000: 2) have intensified the competitive environment in which some of the SPCs operate. This in turn made such companies subject to institutional and the technical (competitive) pressures.

These socioeconomic and political antecedents that characterized the structure of the Syrian economy, had their effect in creating an institutional environment, with certain organizational attributes, which seem to impinge on the characteristics and the change of MA systems. The potential influence of the institutional and other organizational and technical peculiarities, on the practice of SCS, will be examined in the subsequent sections.

## 4-2 the development of SCS and the other accounting practices in SPCs and the influence of coercive institutional pressures:

The socioeconomic and political developments in Syria, which resulted in predominance of the public sector in the main industries, led the Syrian government to construct an institutional legislative framework, which formed the basis of organizing and managing SPCs.

The pre-1974 period was characterized by lack of organized accounting in SPCs. Investigating accounting practices in SPCs at the time shows diversity in the accounting methods, principles, and procedures which in turn made the accounting figures lose their comparability (Kadah, 1979: 219).

Hence, government authorities placed considerable emphasis on regulating the accounting practices, making them more homogenous, and sought to connect the SPCs with the relevant higher supervisory authorities.

This desire, to some extent, has been satisfied by means of a uniform accounting system, and in 1974 the first Syrian Uniform Accounting System UAS came into effect. The system endeavored to eliminate diversity in the accounting practices within the public firms by unifying the accounting rules and procedures.

This institutionalization of the accounting rules by the legislative force of government (Decree 21/T, 1974) aimed also to link the enterprise's accounts with the national accounts (Decree 21/T, 1974: 19; Kadah, 1979: 240), by means of the unified code and budgeting system that helped government in centralized planning.

However, the first version of UAS confronted several problems in practice, which resulted from overlooking cost accounting (Decree 287, 1978: 5; Kadah, 1979: 240).

In 1978, the initial version of UAS was subject to a revision that led to the issue of the legislative decree No. 287 (1978) which endorsed the new UAS.

The new UAS (1978) is considered a turning point in the history of accounting in Syria (Kadah, 1979: 241).

The legislation justified this adjustment and identified the aims of the new version of unified system as follows (Decree 287, 1978: 5):

1. Separating the company accounts from the national accounts so that the new system can meet the needs of the company.
2. Extracting the national accounts statistically.
3. Integrating cost accounting and financial accounting.
4. Establishing the main unified bases of cost accounting.
5. Defining all the terminologies related to cost and financial accounting.
6. Unifying the bases of evaluating the fixed assets and calculating depreciation.

Before extending the discussion concerning the potential impact of the coercive institutional environment of government institutions on the development of SCS in Syria, it is useful to outline the main features of the UAS and its principal rules, which govern cost accounting. It should be noted that hereinafter in this thesis reference to the UAS is to the 1978 version.

### 4-2-1 The UAS general features and costing rules:

The main characteristic of the UAS is its unified code of accounts, which provides a specific number and a name of each account and full explanation for what it means and how to use it (Jlilaty, 1993: 83).

The system classifies the accounts into four main homogenous groups so that they can help in preparing the national accounts and serve the needs of traditional financial accounting as follows (Decree 287, 1978: 18):

1. Balance sheet accounts, which contain the assets, and liabilities and they have been given the unified code numbers (1, 2) respectively.
2. The usage (costs) and revenue accounts that have the unified code numbers (3, 4) respectively.
3. The cost center control accounts, which have the code numbers from 5 to 9.
4. The results accounts (financial statements related accounts) and they were assigned the code number (0).

Table (4-1) shows how the total accounts are connected to the financial statements, as the UAS requires (Decree 287, 1978: 19). The table shows groups of accounts that consist of one digit, which are called ***'total accounts'***; it illustrates also how these total accounts are linked to a particular result account (financial statement). The extent of analysis and the number of the sub-accounts that are classified under each total account are dependent upon the size of the company and the nature of its activity (Decree 287, 1978: 21-55).

**Table (4-1) the relation between the total accounts and the result accounts in the UAS - summarized from Decree 287 (1978: 19)**

| Total accounts | Code No. | Financial statements | Code No. |
|---|---|---|---|
| **Assets** | 1 | Balance sheet | |
| **Liabilities** | 2 | Balance sheet | |
| **Usages (costs)** | 3 | Should be Allocated to the cost centers (5-9) | |
| **Revenues** | 4 | Trade accounts and P&L account | 02, 03 |
| **Production cost centers** | 5 | Operating accounts | 01 |
| **Service centers** | 6 | Should be allocated to the other cost centers | |
| **Marketing centers** | 7 | Trade accounts | 02 |
| **Administrative centers** | 8 | P&L account | 03 |
| **Capital operations centers** | 9 | The related fixed asset account | |

It is not intended to discuss financial accounting rules in detail; instead the discussion in this section is confined to outlining the main features of the costing system.

As noted earlier, the UAS aims, among other things, to organize cost accounting in the SPCs. The rule number (7) of UAS required that:

*"A hierarchal organizational structure for the organization should be prepared, which displays the functional relationships between the different managerial levels. A separate department, which is linked to the financial controller, should be established, within this structure, and holds the responsibilities and the tasks of cost accounting"* (Decree 287, *1978: 56).*

The same rule divided the costing department into the following sections:

- Materials and products accounting section.
- Cost records section.
- Standard costs, statements and reports section.

Establishing a costing department in each public company reveals the serious interest that has been shown by government to achieve more control over the cost elements. The system uses a typology of cost items, which relies on the nature of those cost elements in order to classify them into homogenous groups and terms them ***"Usages".*** Table (4-2) shows the detailed accounts, at the level of two digits (general accounts), of the total account "usages".

**Table (4-2) Usages (cost elements) under the UAS rules**

| **Usages (cost elements)** | **3** |
|---|---|
| Wages | 31 |
| Merchandised requirements (materials) | 32 |
| Service requirements | 33 |
| Purchases for reselling purpose | 34 |
| Current transferring expenses | 35 |
| Special current transfers | 36 |

Apart from the 'special current transfers' (which contains those expenditures that are expired without any potential benefit, such as capital losses and bad debts, that should be charged to the P&L account), all the other usages are controlled by allocating them to certain cost control centers; then the costs found in each cost center should be reallocated or written off against one of the results accounts (Financial statements).

Figure (4-2) displays the mechanism by which the usage accounts are linked to the cost centers and result accounts, as required by the UAS.

As can be seen from figure (4-2) the mechanism of allocating the different cost elements, as it is portrayed by the UAS is similar to those traditional western methods shown in the MA textbooks, in that it relies on the two stages cost allocation process.

UAS identifies indirect costs as they 'are the set of cost elements, which cannot be traced directly to a production unit or a cost centre' (Decree 287, 1978: 30).

According to the UAS those costs consist of:

> *"all the costs found in the service centers that should be reallocated to the other costs centers; and the costs found in the marketing and administrative centers that should be charged to the production" (Decree 287, 1978: 86).*

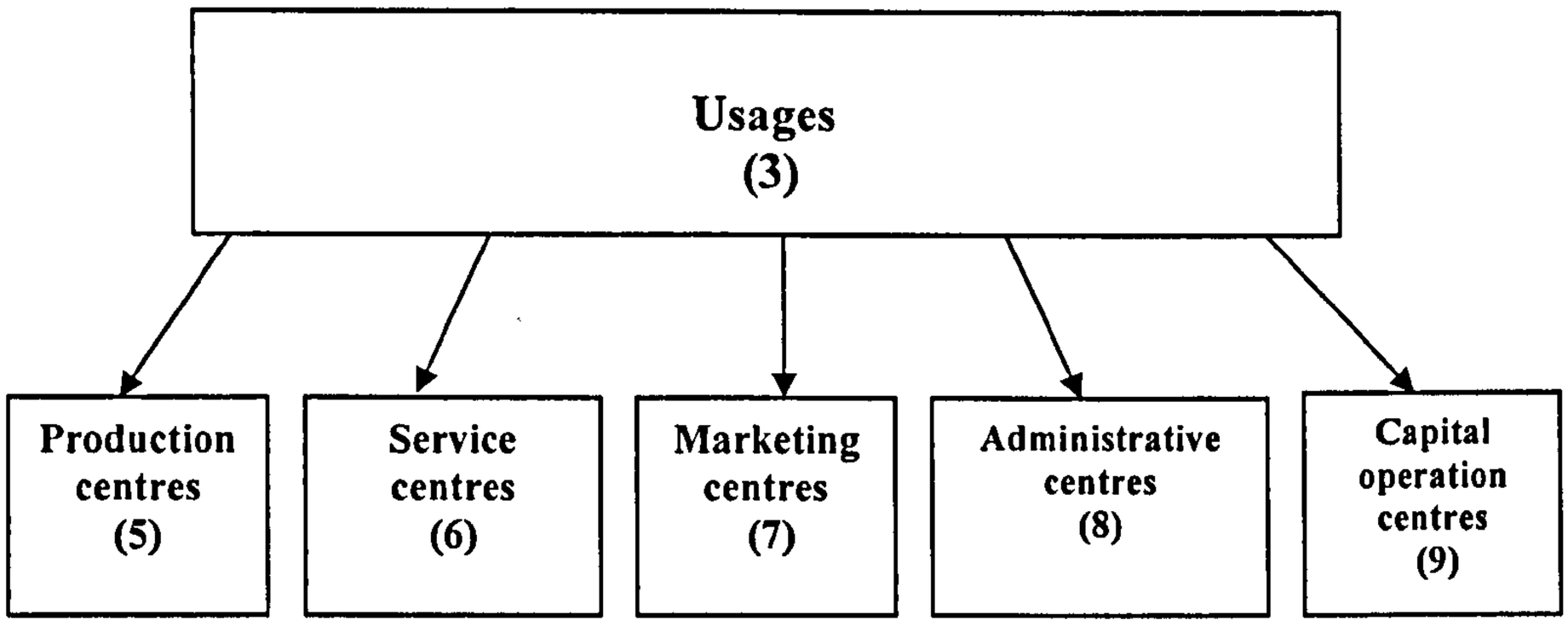
Another main attribute of the UAS is its unification of the bases of evaluation and costing methods.

For example the system asserts that fixed assets should be evaluated at their historical costs, which represent the initial price paid to the suppliers, along with any additional charges paid until the asset becomes ready to be used.

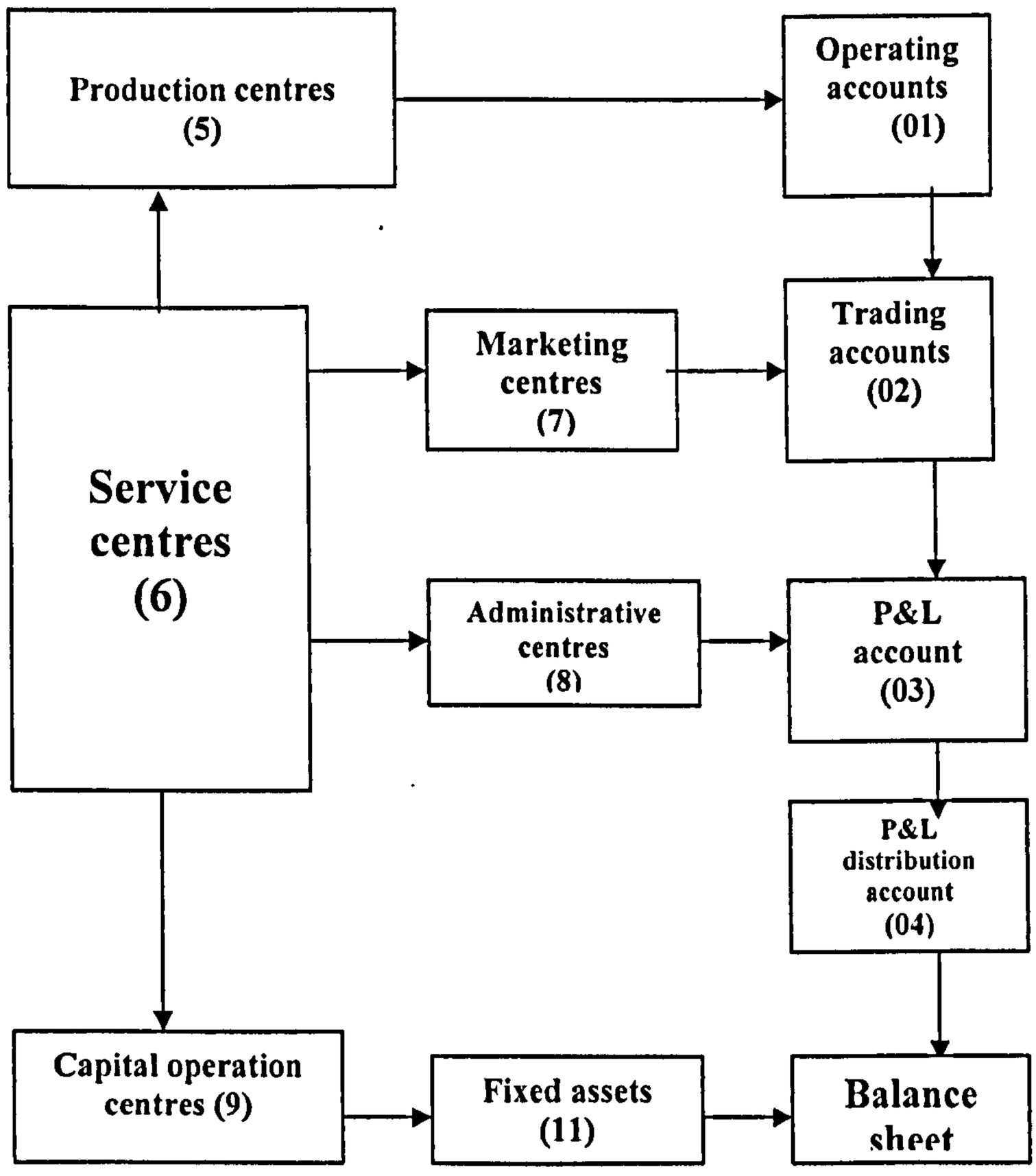
Moreover, SPCs should commit themselves in calculating the depreciation of the fixed assets regardless of the financial results of the period, using the straight-line method without any deduction of the residual value (Decree 287, 1978: 13).

**Figure (4-2) the relationship between the usages accounts and the cost centre and result accounts according to UAS:**

***First stage cost allocation of usage accounts to cost centers (panel 1)***




***Second stage cost allocation, reallocating the costs in the service centers, and matching the other cost centers with the relevant result accounts (panel 2)***




***Resource: Summarized from the (Decree 287, 1978: 19-20)***

Concerning the stock of finished goods and work-in-progress (WIP), the system provides the following unified rules:

- Evaluating the stock of the finished products at its production costs, which includes the costs of production and service centers related to this stock. In the case that the market price of this stock is less than its cost a provision should be formed to meet the difference (The *cost or the market price whichever the lowest* rule) (Decree 287, 1978: 13).
- Evaluating the incomplete products (WIP) and the jobs under completion at their production costs according to their level of completion (Decree 287, 1978: 13).

Plainly UAS has shown a special interest in organizing the cost accounting in SPCs. The legislator has adhered to those conventional costing methods widely used in the developed countries, such as the USA and the UK, that have dominated the costing practice in those countries for about a century.

The UAS rules, which are still in force, give the impression that the costing systems in the SPCs are probably highly traditional and shaped by the hegemony of absorption costing system.

Obviously the Syrian government has played considerable role in creating a set of institutionally induced accounting practices, which might have been perceived as the best practice. The rules embodied in the UAS went a further step by endeavoring to introduce SCS into SPCs. The state, probably, wished to use what was considered the prevailing innovative MA system at that date (1970s), which was attracting the interest of organizations in developed countries.

The next section considers the main rules that governed the introduction of SCS into the SPCs context.

### 4-2-2 SCS in SPCs and the influence of coercive state's regulations and direct authority relationships:

As previously noted, NIS approach has considered government mandates as a main source of isomorphism (Meyer &Rowan, 1977; DiMaggio and Powell, 1983).

In Meyer &Rowan's opinion:

> *"The formation of centralized states and the penetration of societies by political centers also contribute to the rise and spread of formal organization". (1977: 342)*

Coercion might follow also from direct authority relationships and pressures exerted on organizations by other organizations upon which they are dependent (DiMaggio and Powell, 1983).

The intervention of state agencies in shaping the isomorphic change in the organizational structures, as prescribed by institutionalists, seems evident in the context of SPCs. The rules embodied in the UAS reflect the state's endeavor to use its legislative power, to diffuse what it considers desirable in MA systems, namely SCS and budgetary control.

Understanding the potential influence of government institutions, as a coercive force, on shaping the practice of SCS in SPCs, and the impact of other coercive pressures, requires a brief investigation of the UAS rules that govern this technique.

The UAS defines standard cost as:

> *"A predetermined norm of measurement, which covers certain period of time and established relying on technical and analytical studies for each cost element at the level of product unit or cost center; by which actual costs are compared so that variances can be defined and analyzed" (Decree 287, 1978: 16).*

As mentioned earlier the system requires the establishment of a *'standard cost, statements and reports'* section within the cost accounting department in each

public company. It defines the main responsibilities of this section as follows (Decree 287, 1978: 87, rules 7, 10; Jlilaty, 1993: 235-236):

1. To contribute, with the aid of the technical engineers staff in the company, to establishing standards for:
   - Materials' usage rates.
   - The allowable waste rates.
   - Rates of allowable breakdowns.
   - Rates of standard time of production.
2. Reviewing the established rates for each financial period in the light of the change in the company's conditions and when it is necessary.
3. Analyzing the working hours into productive hours and breakdown hours in each cost centre.
4. Analyzing the usage of the materials and comparing it with the production and the waste.
5. Calculating the wage rate per hour for the cost centers.
6. Providing periodic cost statements (sheets) and final cost statements at the end of the financial period in order to help in evaluating finished production; defining the selling price for products and studying the harmonization between the established prices and the actual costs of the products.
7. Contributing in establishing the company budget taking into consideration the following:
   - Defining the marketing and production objectives for the forthcoming year, and preparing the budget for the organization as a whole, which

covers the different needs of achieving the goals, including wages, merchandized and service requirements.

- Allocating the budget to the cost centers and establishing a budget for each cost center, which defines its budgeted usages and production.
- Allocating the budget over the months of the year.
- Monitoring the actual execution of the production plan by comparing the actual performance with the budget and clarifying the positive and negative deviations.
- Providing periodic reports to the upper managerial levels, showing the actual implementation of the production plan and analyzing the variances from standards.

Obviously the responsibility for designing and operating SCS was attached to the 'standard cost, statements and reports' section in each SPC as the UAS rules discussed above requires. The section should establish cost standards with technical support from engineers and experts in the company concerned. This in turn might indicate that the successful adoption of SCS would be reliant on the intra-organizational capabilities of SPCs and the availability of sufficient resource, which make conformity to institutional pressures possible.

In discussing the cost statements and reports the UAS has provided some hints for using variance analysis. However, the rules are very general.

The cost reports (control reports), for example, have been divided into two kinds, tracing and cost reports. They aim to compare the actual performance with the estimates.

For example, the system has referred to the material usage efficiency report (see Decree 287, 1978: 66), which shows the following information:

- Types of raw materials used.
- The standard usage (quantity) rate per unit as they are defined in the standard costs (A).
- The actual accepted production of the center (B).
- The standard quantity for the actual production (A x B).
- The actual quantity consumed in the production.
- The deviation from the rates and its reason.

The UAS has mentioned also the operating hours efficiency report, which contains 'the name and the number of the cost center; available operating hours (hours per shift x number of workers in the center x days in the period); actual operating hours (without the breakdown hours); Breakdown hours (the deviation between the available and actual hours); standard breakdown rate; actual breakdown rate; the deviation and its portion and reason' (Decree 287, 1978: 66).

It continues in discussing these rules and insists

*"The production costs report includes:*
- *The name and the number of the cost center.*
- *The actual production of the center.*
- *The actual and estimated average cost per unit for the last period.*
- *The deviations in the cost per unit."*

Commenting,

*"The cost department should provide supplementary report which shows the reasons for the important variances and their justifications" (Decree 287, 1978: 67).*

One of the most important issues, which have special implications for the search of institutional conditions connected with the practice of SCS in SPCs, is the fact that the legislator realizes there would be difficulties in a sudden enforcement of the new regulations related to the use of SCS. It has provided some rules regarding

the change towards the new UAS. For instance the rule No (16) deputed the related Minister in defining the date of applying SCS.

*"The organization[3] should commit itself in applying standard costing within a certain period that should be defined by the related Minister" (Decree 287, 1978: 79).*

The above documentary evidence suggests that, while it is true that the institutional coercion by means of government regulations triggered the increased interest in introducing SCS, the genuine alteration would be reliant on the pressures exerted by supervisory authority on SPCs to design and implement SCS. That is what really matters in affecting the responsiveness of SPCs to SCS rules might be the 'direct authority relationships' (DiMaggio and Powell, 1983: 151) between those companies and the external constituents in their institutional environment upon which they are dependent (general organization and/or Ministry of Industry).

In short, it appears from investigating the different UAS rules concerning the introduction of SCS into the SPCs that the endorsement of the decree (287) 1978, which embodied the UAS, has triggered the theoretical introduction of SCS into SPCs context.

The institutionally induced rules have outlined general features of SCS that should be used by all SPCs. The coercive institutional force of government mandates that SCS should be adopted, and one would expect that the isomorphic change towards the diffusion of SCS in SPCs has been achieved. However, deputing the related

[3] The UAS defined what is meant by 'Organization' the public organization or public company or the firm, which engages in the economic activity and enjoy independent entity. (See Decree 287, 1978: 23) This means that the mentioned rule covers public organizations and the public companies alike, which are all exempted from an immediate application of SCS. This in turn kept the door open to the internal conditions of those companies and the pressures of supervisory authority to define the date of introducing SCS.

Minster to define a date for the execution of the rules implies possible deviations in the pressures exerted by institutional forces on each company. That is the responsiveness of SPCs would be reliant upon the direct authority relationship and the level of pressure exerted on them by supervisory authorities.

It should be noted also that the rules of the UAS imply also a multiplicity of institutional constituents (the ministry, public organizations) that intervene in the management of SPCs, which might impose conflicting requirements that might bind their ability to conform to expectations. In such an institutional environment, it is expected also that some institutions may contradict each other and, therefore, cause a resistance for the change. Oliver notes

> *"Institutional constituents, including the state, professions, interest groups, and the general public, impose a variety of laws, regulations, and expectations on the organization"* (1991: 162).

Such conflicting institutions are expected to 'bound the ability of organizations to conform to the institutional pressures' (Oliver, 1991: 162).

In the SPCs' context certain institutions, and social beliefs and expectations seem to conflict with the technical requirements of the institutionally induced SCS. That is, what is societal and what is technical in SPCs environment are intermingled (Salama, 2000: 4). An example of such conflicting institutions is the government policy regarding the absorption of labour force, which has created an over-manning problem in most of the SPCs (Al-Sayed, 2001: Abstract; Al-Zaim, 2004: 11).

Such a policy contradicts the requirements of applying SCS, which aims, among other things, at achieving more control over labor resources.

NIS theory suggests that Syrian public companies, subject to explicit coercive pressure, would adopt SCS. However, there is lack of evidence depicting actual

practice and some Syrian authors suspect that SCS might not be widespread. Empirical evidence is needed in order to test the NIS prediction.

## 4-3 SCS in SPCs and the influence of the other voluntary institutional forces:

The potential influence of the other institutional forces informed by NIS, particularly normative pressures of professional bodies, in shaping the practice of SCS in SPCs is not clear in the available Syrian MA literature. This section will review the available studies on the topic to evaluate the potential effect of the other institutional factors.

MA literature in Syria saw few works on the subject of SCS, following the issue of UAS in 1978. It is surprising and interesting; therefore, that the intention of diffusing an obligatory practice of standard costing in Syria preceded the theory of this technique in Syrian MA literature. This is completely different from the mechanism by which SCS has developed in the UK, where normative pressures from academics and professional bodies theorized SCS and created a rule like ideology in favor of the usefulness of SCS. This in turn might enhance and encourage its application.

Helwa-Hanan (1987) has mentioned:

> *"Standard costs accounting as a teaching module was introduced into Aleppo University in the academic year 1979- 1980, following the issue of the unified accounting system" (1987: 7).*

In the absence of effective professional bodies (Kamla, 2006: 11), Syrian universities have constituted the main source of MA knowledge.

Thus UAS stimulated the interest of Syrian authors in this technique. The first SCS textbook to exist in Syria was edited by S. Kadah in 1979 and published by

Damascus University. This initial work was followed by two other books on the subject and written by Helwa-Hanan (1981) and Fakher (1993), and published by Aleppo and Tishreen universities respectively. These textbooks aimed to clarify the technique and provide students with a theoretical education before they start their professional life, which in turn can enhance the practice of the system.

Although Syrian MA literature has shown considerable interest in clarifying SCS theory, very limited studies, however, tried to examine the practice of this technique scientifically.

Some of the mentioned textbooks, yet, embodied some hints, which criticized the practice of SCS from the perspective of the different rules of UAS, rather than from the perspective of a systematic scientific research that examines what happens in practice.

For example, Helwa-Hanan has felt

*"The UAS in Syria has compelled the organization to apply SCS. It does not, however, define the accounting method to be used in applying it and how to treat the variances. It only mentions the responsibility of standard costs, statements and reports section" (1987: 171).*

Fakher (1993) suspected the existence of effective '*Standard costs, statements and reports section'* in many of the public companies and has expressed his personal opinion about this issue:

*"Studying the practice in the majority of the Syrian manufacturing companies reveals that there is no effective 'standard costs, statements and reports section', scientific standards for the usage of raw materials, allowable waste rates, allowable breakdown rates and wage rate per labour hour were not established...Budgets are still established depending on the previous actual accounting figures without any scientific studies or any analysis for the productive conditions under which the company operates"(1993: 112).*

The same author suggests that given the lack of expertise 'it could be beneficial to gradually apply SCS; direct material could be a starting point, for example' (Fakher, 1993: 114).

Reviewing the available scientific economics journals published by the Syrian universities (Tishreen University Journal, Damascus University Journal and the Research Journal of Aleppo University) revealed that the research, which dealt with costing practices in Syria, was scarce. Very few studies tried to examine costing systems in general and SCS in particular.

The available studies on the subject of SCS are oriented towards describing and clarifying the bases of standardizing some cost elements and how to organize the standardization process in the economic units (Fakher, 1998; Fakher, 2000).

MA literature in Syria, therefore, showed considerable understanding of the technique, with the universities and the academic specialists providing the main source of accounting knowledge in SPCs institutional environment.

Notwithstanding the effect of this source, it might not be sufficient to secure continuous development in accounting knowledge among the practitioners who will face difficulties in finding solutions to the practical problems that they might confront.

The lack of evidence for an effective role for the professional bodies means a potential lack of knowledge among Syrian practitioners. This in turn could affect the extent of conformity to the induced institutional rules. It implies also the lack of consultants and professional experts who should contribute in designing SCS.

Finally, academic suspicions regarding SCS practice raise concern about the adequacy of the institutionally induced government rules in causing the isomorphic change towards the use of SCS in SPCs context. Other intra-

organizational factors are likely to interact in influencing this use, and will be examined in the next section.

## 4-4 SCS and the effect of the intra-organizational related factors in the SPCs context:

This section investigates the intra-organizational and administrative characteristics, and some technical requirements, which might affect the ability of SPCs to conform to the institutionally induced SCS.

### 4-4-1 SCS in SPCs and the impact of cognitive capacity (lack of awareness and training):

Though there is little research exploring the practice of SCS in Syria, some writers theorized the conditions that can facilitate the use of SCS.

According to Fakher, one of the main conditions that can facilitate the use of SCS is 'the availability of technical, economic, and accounting experts' (Fakher, 1993: 34).

The author notes that the introduction of SCS into the Syrian context is a difficult task, which is likely to flounder given 'the lack of expertise and qualified staff' (Fakher, 1993: 113).

Others have commented on the lack of skilled employees at the different managerial levels in SPCs (Salama, 2000: 5; Al-Sayed, 2001, abstract). This lack of competence has been attributed to 'the weak qualification and lack of training programs' (Salama, 2000: 5).

Sukkar, claims that

*"only 10% of the Syrian workforce have an undergraduate certificate and only 15.5 % of the staff that work at the public sector have the undergraduate qualification" ( 2004: 4 -7).*

It follows from the discussion that the lack of knowledge among accounting and managerial staff, the lack of training and the technical experts are possible inhibitors that might affect the ability of the internal actors in SPCs to respond to the institutional pressures that require the use of SCS.

### 4-4-2 SCS and the influence of the organizational and managerial capacity (resources availability):

Both management and management accounting literatures in Syria have referred to some managerial and organizational attributes in the SPCs context, which might interact in affecting the use or non-use of SCS in those companies.

The efficacy of managing the public sector in Syria, and the need for managerial reform, has attracted a considerable interest of many Syrian researchers in recent years (Abu-Sekkeh, 2004; Al-Khouder, 2004; Mreiden, 2002; Salama, 2000).

Al-Khouder, for example, has argued that there is a lack of competence in the management of public sector in Syria (2004: 4). Similarly Abu-Sekkeh argues that in Syria there is, in general, 'a lack in the number of qualified people in the sciences of modern management' (2004: 2).

In his final report concerning the reform of the industrial public sector, Mreiden has contended that lack of management experts is one of the reasons of low performance in this sector (2002: 7).

In terms of the availability of the other resources, there has been recognition by some Syrian authors of the considerable impact of computerization on the use of SCS. Fakher for example, claims

> *"Using computers is a prerequisite for the successful application of standard costing system, because it saves time, efforts, and costs." (1993: 34).*

Some commentators, however, have criticized the technological capability of Syria, as being weak.

Sukkar, for instance, mentions

*"There are in Syria 16.3 computers for each 1000 inhabitants, comparing to 56.2 computers per 1000 inhabitants in Lebanon" (2004: 4).*

The manufacturing technological capabilities in SPCs have also been criticized. It has been argued that the institutions that required the transformation of the economic surpluses of SPCs have weakened their ability to replace the out of date machines and renew their production capacity (Salama, 2000: 4).

Out of date manufacturing technology would increase waste and might result in unfavorable variances, which in turn might cause refusal for adopting SCS in such context.

It is likely therefore that the lack of organizational and managerial capacity in terms of competent management and sufficient resources might cause resistance to the introduction of institutionally induced SCS in SPCs.

**4-4-3 Conformity of SPCs to SCS rules and the influence of willingness factors (expected gains and losses)**

Many authors have referred to the importance of motivation in helping management to avoid the negative attitudes of subordinates to the standards of performance (Horngren, 1990: 169). Motivation can be achieved by means of the participation in establishing performance standards, and linking rewards with performance.

The conformity of the SPCs to the SCS rules would be affected by the economic gains to be achieved or losses and sanctions that might be faced by internal actors, from positively responding to, or resisting the institutional pressures. Thus, greater

expected gains from the adherence to the institutions would mean greater extent of conformity (Oliver, 1991: 161).

The rationality and the technical objectives that stand behind inducing SCS are summarized by the UAS. It considers the technique as

*"an effective tool for production control, increasing the productivity and the profitability, reducing the costs and helping in establishing the different budgets" (Decree 287, 1978: 71).*

Thus conformity of SPCs to institutionally induced SCS might depend on the extent to which companies are willing to use SCS to achieve the so-called economic benefits of the system.

The availability of self-interest motivation for using SCS, such as effective incentive schemes that link rewards with performance, would also contribute to the responsiveness of the internal actors within the organizations to the institutional rules.

Commentators on the administrative process in the public sector claim that it suffers from weak incentive schemes to the extent that they seem 'without any actual effect or value' (Salama, 2000: 5), and that there is a 'lack of incentives; [and] low motivation' in SPCs context (Mreiden, 2002: 7).

Other authors have ascribed the weak performance of SPCs to the absence of accountability for the public management (Al-Khouder, 2004:19).

It is likely, therefore, that the lack of willingness and accountability, that is the expected gains or losses that might result from conformity or resistance to the institutional rules, would affect the extent of use of SCS in SPCs.

## 4-5 Summary of chapter (4):

This chapter has examined the different institutional and intra-organizational factors that might influence the development of SCS in SPCs context.

More explicit is the impact of coercive institutional force of government mandates and rules in increasing the interest in using SCS in SPCs. The analysis of UAS rules indicates that the most important institutional condition of conformity, or resistance, of SPCs to SCS rules might be the direct authority relationship, manifested in direct pressures exerted on those companies by supervisory authorities upon which they are dependant. Conflicting institutions might also render full application of SCS unachievable.

Academics and universities provide the main source of SCS knowledge with the absence of sufficient evidence of effective role of professional bodies.

The coercive institutional pressures suggest that SCS should be widely used in SPCs as the proponents of NIS propose. Academic suspicions, however, put in doubt the actual use of the technique, and this in turn suggests that the other intra-organizational factors might impact the use of SCS in this context.

Lack of knowledge and qualified staff and mangers, lack of motivation, and shortage of technological resources, are important organizational characteristics of SPCs context, which have been cited in the Syrian Management and MA literatures and are likely to affect the responsiveness of SPCs to the institutionally induced SCS.

Observations and insights gained from investigating Syrian MA literature will guide the subsequent steps in developing the empirical study.

# Chapter (5): Research Methodology and design

## 5-1 The main features of the research methodology:

Research methodology 'refers to the overall approach to the research process, from the theoretical underpinning to the collection and analysis of the data' (Hussey & Hussey, 1997: 54).

The research methodology that a researcher might adopt will be affected by the paradigm, which he or she has selected. That is his or her way of thinking about the development of knowledge (Saunders, Lewis and Thornhill, 2000: 84). The term paradigm indicates our basic beliefs about the world. It provides a guide for how to conduct a research and defines the ideal methods and techniques to be used in performing this process. Researcher's beliefs about the world, therefore, will affect the way in which the research is designed, the methods used in collecting the data and how the research should be written (Hussey & Hussey, 1997: 47).

Two main paradigms have been identified in the literature, the positivist, and the phenomenological, although some researchers may use other terms such as quantitative and qualitative paradigms (Hussey & Hussey, 1997; David & Sutton, 2004: 35-44).

Positivistic paradigm reflects the philosophical stance of natural scientists (Saunders *et al*, 2000: 85). It looks at reality as objective and singular, apart from the researcher (see Creswell, 1994; Hussey & Hussey, 1997). That is the researcher should be independent from what he is researching.

Moreover, the researcher's values should not bias the research; this tends to an emphasis on quantitative methods that rely on deductive process and use numbers to measure the relationships between things (David & Sutton, 2004: 36).

Quantitative methods focus on studying the variations of two or more phenomena across a large number of cases, aim at testing theories and provide generalizations and predictions of the phenomenon under consideration in a valid and reliable manner (Creswell, 1994: 5). Adopting such a philosophy means that there will be a focus on highly structured methodology to enable replication and 'quantifiable observations that lend themselves to statistical analysis' (Saunders *et al*, 2000: 85). Quantitative researchers, therefore, delineate and fix the boundaries of the population they study, which they assume to be homogenous enough, and from which they try to select a representative sample. Data then is collected from the selected sample in order to explore cross-case patterns that might hold true in that population (Ragin, 2000: 45-46).

Phenomenological paradigm, in contrast, considers reality as subjective and that the researcher interacts with what he is researching. Qualitative research relies on the idea 'that social life is the product of social interaction and beliefs of actors, that the social world is not populated by things, but by relationships and actions' (David & Sutton, 2004: 36). Supporters of this philosophy perceive the world as complex and insights into this complexity will be lost if it is 'reduced entirely to a series of law-like generalizations' (Saunders *et al*, 2000: 86). It focuses, therefore, on meanings not numbers and uses induction in order to explore and gain greater insight into the subjects being studied. Qualitative researchers, therefore, concentrate their efforts on close and in-depth investigation for the phenomenon of interest to unravel its complexity. Analysis is based on 'configurational' logic, which means that the different aspects of a case are examined all at once, as a package, in order to show how they interconnect to form the whole picture of the case (Ragin, 2000: 67). The temptation to discover the detailed complexity of the

subject being studied indicates that the number of cases that can be included in such enquiry is very small (usually, one or two). This approach, therefore, has little generalization potential (Saunders *et al*, 2000: 86) because insights learnt from one case 'must be inherently suspect' (Ragin, 2000: 67).

While social scientists appreciate the knowledge developed by those two mechanisms, they, however, consider the two paradigms as polar ends of a continuum and suggest that combining quantitative and qualitative data is not only possible but it is also advantageous and preferable (Saunders *et al* 2003, Hussey & Hussey 1997: 74, David & Sutton 2004: 44).

Saunders *et al* insisted that researchers might use different research methods in one study for different purposes (2000: 98).

Qualification is embodied in all research classifications. So to quantify things we need to identify and distinguish them.

David and Sutton argue

> *"The capacity to make such qualitative distinctions is the basis upon which any subsequent quantification can take place" (2004: 39).*

According to these authors all research should have qualitative and quantitative elements and combine induction and deduction processes. Most researchers conduct a piloting survey and follow up interviews before they undertake quantitative work. Researchers might start their projects with secondary data or do fieldwork in order to enhance the types of questions they will ask. In depth interviews might lead some researchers to 'clarify their findings with a more numerical questionnaire' (David & Sutton, 2004: 44).

Chenhall (2003: 160) insists that it is very useful to combine case studies and site visits with surveys. Babbie mentions also that researchers might conduct

exploratory field research 'to develop methods to be employed in more careful study' (1992: 90).

Despite researchers' recognition of the complementarity of the two research approaches, social scientists, however, often confront this basic predicament when they do research because they have to choose between the two, regrettably divided, research strategies. That is they either can emphasize the complexity of social phenomena by exploring in depth their patterns of complexity across very few and purposefully selected cases, a strategy which is known as 'case-oriented', 'qualitative', 'small N' or 'intensive'. They alternatively can emphasize generalizability by documenting patterns that may hold true across a large number of cases, a strategy that is known as 'quantitative', 'variable-oriented', 'large N', or 'extensive' (Ragin, 2000: 21).

Charles C. Ragin (2000), an American social scientist and a key critic of the above mentioned methodological divide, observes that in the majority of social science fields there is a negative relationship between the number of instances and number of variables that researchers examine. That is researchers tend to gravitate toward either studying many cases and few variables (quantitative strategy) or many variables but very few cases (qualitative strategy). This temptation has contributed to the unhealthy divide between the two research strategies. He further insists that the plot that represents the relative number of studies and the number of cases has a U-shape in many social science fields (For further details and illustration see Ragin, 2000: 25). He attributes this divide to several factors among which the difficulty of keeping in-depth knowledge and familiarity with a large number of cases, which in turn makes the qualitative researchers focus on examining few cases, and the limited statistical techniques available to analyze data sets of mid

sized N (cases between 10-35), which also pushes quantitative researchers toward large N data sets (see Ragin, 2002: 26-27).

Ragin has suggested, a relatively new methodological approach, which stands between these two camps of complexity (small N) and generality (large N) of research strategies. This approach tries to find a middle ground between the two research methodologies of emphasizing either depth or breadth. The middle ground methodology focuses on 'the study of diversity, an approach that emphasizes seeing cases as configurations of aspects and disaggregating populations into types' (Ragin, 2000: 25).

Ragin has extended Paul Lazarsfeld's (1937) and Allen Barton's (1955) ideas about 'property space' of seeing cases as configurations, to form his new approach and its related analytical tools, which he named 'diversity' approach (See Ragin 2000: 66 - 74).

On one hand, the diversity-oriented approach looks at cases as configurations (combinations of relevant conditions) thereby maintaining the concern of revealing complexity and seeing cases as blends of attributes which, in turn, is a central foundation of case-oriented research. On the other hand this approach keeps also the concern of exploring general cross–case patterns, a corner stone of variable-oriented research.

Ragin considers the diversity approach to be a mid way between the two conventional methodological camps. He insists that:

> *"Studying social phenomena in terms of their different kinds and types lies midway, conceptually speaking, between studying general patterns across "all" cases, on one hand, and attending to the complexity of specific cases, on the other" (Ragin, 2000: 35).*

Diversity approach, however, departs from the homogeneity assumption that underpins variable-oriented research. It also contrasts with the way in which the variable-oriented researcher explores cross case patterns. The variable-oriented

investigator usually examines the relative importance of several variables at the same time to explain variations in an outcome. Variables are, therefore, conceived as independent of each other and the relative importance of each variable is examined while keeping the effect of other variables constant (Ragin, 2000: 33). Each variable is seen as sufficient for the outcome 'regardless of the values of other causal variables' (Ragin, 2000: 33). The diversity approach, in contrast, perceives causation as conjunctural, and 'Causal conditions do not compete with each other as they do in correlational research; they combine' (Ragin, 2000: 33). The aim of diversity research is to show causal conditions shared by cases, which in turn provides a clue to assess necessary conditions or combinations of conditions.

Studying cases as configurations, in diversity research, therefore, does not inevitably mean entirely abandoning variables. It means that the idea of seeing the variables as independent and separable attributes of cases (one of the main assumptions of variable-oriented research) has to be abandoned and 'variables should be seen as the components of configurations' (Ragin, 2000: 74). In his earlier work Ragin (1987) developed a key diversity analytical tool known as 'qualitative comparative analysis', QCA, which he then extended in subsequent work (Ragin, 2000) into fuzzy set QCA, fs/QCA. (Both QCA and fs/QCA will be discussed in detail later). At the center of these two diversity techniques is the concern of attending to the complexity of social phenomena and the identification of necessary and sufficient conditions connected with an outcome (Schneider and Wagemann, 2005: 2).

Given that the major objective of this thesis, in addition to exploring the practice of SCS and the relevant factors associated with its use, is to discover the interplay

between the institutional and intra-organizational conditions and how they combine in affecting the conformity or resistance of SPCs to the institutionally provoked SCS, diversity –oriented strategy seems the most suitable to achieve this objective.

The research strategy adopted in this thesis, therefore, focuses on using the diversity approach and set-theoretic logic to capture the complexity of MA change, in SPCs context, which has largely been seen by MA researchers as a very complex social phenomenon (Granlund, 2001: 143).

To achieve this goal, however, the researcher has had to adopt sequential mixed research methods (Creswell, 2003: 9), which incorporate elements of both qualitative and quantitative approaches at the different stages of the research process.

At the early stages of the research qualitative data was collected through historical analysis and fieldwork visits and formed a vital part of this research for two reasons. Firstly, given the little knowledge available about the topic and the phenomenon being studied, it was necessary to conduct a thorough literature search and some early site visits in order to gain full understanding of the factors that might be relevant in affecting the adoption, or resistance to the adoption, of SCS by SPCs. Secondly, qualitative data enabled the extraction of certain indicators, which facilitated the operationalization of the main constructs of concern, the formulation of the research hypotheses and the development of the instrument used to collect the main data for this research.

At the second stage of the research the researcher used quantitative methods to collect the main data. At this juncture, and based on the suggested theoretical

framework and the qualitative data collected in the first step, research hypotheses were formulated and data gathering procedures were undertaken.

The quantitative data aimed at achieving the first two objectives of the thesis. That is on one hand to explore the practice of SCS in SPCs and how the system has been used, and on the other hand to test the research hypotheses and explore the most relevant factors associated with the extent of use of SCS. It also formed the basis for set-theoretic analysis and, thereby represented an intermediate phase, which enabled the focus on more relevant conditions, and provided the basic data that the researcher then used in the QCA and fuzzy set analyses. Set-theoretic techniques (QCA, and fuzzy set) were used to satisfy the last and main objective of the thesis of exploring the variety of combinations of relevant conditions connected with the responsiveness of SPCs to the institutionally induced SCS.

Thus, consistent with what Ragin has suggested, relevant conventional variables explored in this thesis, using the quantitative approach, were used later in the set-theoretic techniques as 'raw material for delineating types, not as analytically distinct, independent attributes' (2000: 74).

The researcher, therefore, departs, at the last stage of the research, from the assumption of homogeneity underpinning quantitative research (such as the assumption that the group of SPCs users of SCS are homogenous enough to equate them in one group, which has been adopted in the early stage of the research to find the relevant variables that distinguish this group from the non-users) by adopting diversity logic, which attends to the heterogeneity embedded in the collected data. The aim is to get deeper insights into the patterns that the cases exhibit, and explore the different paths leading to the use or non-use of SCS.

Thus, the researcher wishes to discover how the groups of users and non-users of SCS differ in respect of institutional and intra-organizational conditions. This induces recognizing the complexity of the MA change in SPCs setting and exploring the different combinations of the relevant conditions connected with the two types of organizational behaviors that lead to resisting or conforming to institutionally invoked MA practices.

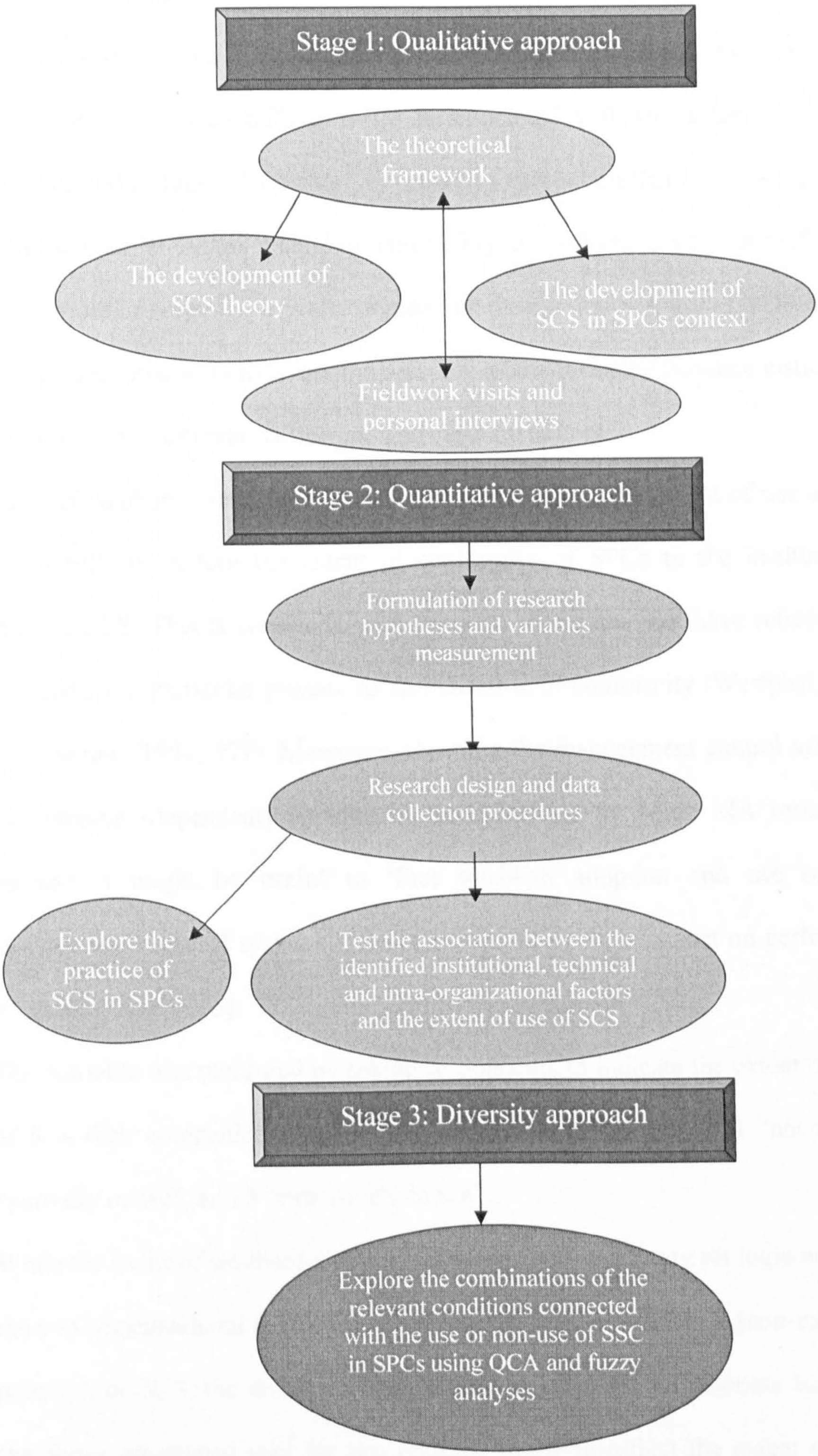
Figure (5-1) illustrates the logic of the research methodology adopted in this thesis.

As the figure shows the research methodology adopted in this thesis combines qualitative and quantitative data in order to satisfy the research objectives.

The research starts with collecting qualitative data through the historical analysis, discussed in chapters (3, and 4); the researcher then conducted fieldwork interviews (discussed later in this chapter) that formed the bases for formulating the research hypotheses and building the survey instrument. A hand-delivered questionnaire instrument was used to collect the main data from a selected sample of SPCs in order to satisfy the research objectives. That is to explore SCS practice, the different institutional and intra-organizational elements associated with its application, and how these relevant conditions combined in shaping the change, or resistance to change, toward this traditional MA technique in SPCs context.

Having discussed the historical analysis in the last two chapters the following sections will illustrate the different procedures related to the formulation of the research hypotheses, instrument development and data collection.

**Figure (5-1) The logic of the research methodology**



## 5-2 Research hypotheses and variables measurement:

### 5-2-1 introduction

As previously noted a core argument in this research is that the extent of use of the institutionally induced SCS in SPCs is associated with the extent of external coercive and technical (competitive) pressures exerted on them on one hand, and with the internal factors related to their ability and willingness to use SCS on the other. More importantly, it is also argued that the use and non-use of SCS in SPCs, as organizational responses, are the outcome of the interplay between institutional and intra-organizational willingness and capacity factors.

Thus, the outcome variable of concern in this thesis is the extent of use of SCS, which reflects in turn the extent of conformity of SPCs to the institutionally induced SCS. This is consistent with previous researches that have relied on the existence of a particular practice as an indication of conformity (Westphal, Gulati and Shortell, 1997: 377). Moreover, choosing the management control system as an outcome (dependent) variable is recommended by some MA researchers, because it might be useful to 'first establish adoption and use of MCS [management control systems]' before investigating their impact on performance (Chenhall, 2003: 135).

This variable was measured by asking respondents to indicate the extent of use of SCS in their companies, using a three-point scale, ranging from 1 "not used", 2 "partially in use", and 3 "extensively in use".

While the focus of set-theoretic analyses using QCA and fuzzy set logic will be on the two organizational responses of conformity (use) or resistance (non-use) to the adoption of SCS, the researcher has decided to measure the outcome variable in the above mentioned way for two reasons; firstly to reflect the extent of use of

SCS and allow respondents to evaluate their use of the technique, rather than simply asking them whether they use the system or not; and secondly to use an ordinal scale level of measurements. An ordinal scale allows the use of more statistical tests to satisfy the objective of testing research hypotheses and unravel the most relevant conditions. Statistical tests that deal with nominal levels of measurement are limited and become more difficult to apply in the case of small sample size. In such unfavorable conditions it is recommended to get higher-level of measurement (Babbie, 1992: 139).

Drawing on the suggested theoretical framework that has been discussed so far in the second chapter (see figure 2-2 chapter 2), this section proceeds by discussing the formulation of the hypotheses concerning the association between the latent independent variables and the extent of use of SCS, the logic behind each hypothesis, and how the variables have been operationalized.

### 5-2-2 Hypotheses related to the association between the external environment variables and the extent of use of SCS in SPCs:

The first group of composite variables is related to the external environment. MA researchers have considered that the external environment will continue to be a key contextual factor in contingency-based research (Chenhall, 2003: 139).

The institutional perspective has focused mainly on the institutional elements and placed less emphasis on economic derived forces (competitive pressures) (Major & Hopper, 2003: 25- 26; Tsamenyi *et al*, 2006: 410).

In contrast, contingency research considers the economic derived forces, such as level of competition and environment uncertainty (Otley, 1987: 95; Mitchell and Walker, 1997), and overlooks the influence of institutionally derived pressures.

It is, however, increasingly recognized that changes in accounting systems and other organizational structures are driven by elements of both institutional and competitive pressures (Tsamenyi *et al*, 2006: 412-413).

Chenhall cited Granlund and Lukka (1998) who noted that:

> *"pressure may come from economic causes, coercion from institutions, normative pressure derived from appropriate social conduct, and the tendency to mimic apparently successful practices"* (2003: 139).

In this thesis the researcher has considered the two main elements of external environment namely, the economic (competitive technical), and coercive institutional pressures. Such a combination accounts for the two perspectives and provides better understanding for MA change in SPCs. Moreover, the researcher has decided to include these two variables because the Syrian literature suggests their relevance in SPCs context. It is, therefore, intended to explore whether or not the two forces might coexist together in SPCs environment, and if so which force might be relevant in affecting the use of SCS.

**5-2-2-1 The impact of institutional coercive pressures:**

Coercive pressures refer to 'the formal and informal pressures exerted on organizations by other organizations upon which they are dependent' (DiMaggio and Powell, 1983: 150), and sometimes the pressure is a result of government mandate and legal coercion (DiMaggio and Powell, 1983: 150; Oliver, 1991: 167, Tsamenyi *et al*, 2006: 428).

Thus coercive pressures might follow from influential organizations, which impose influence on other organizations through direct authority relations (DiMaggio and Powell, 1983: 151).

As discussed earlier general organizations in Syria represent the governmental authority that hold the responsibility of supervising similar public companies and securing the execution of the government mandates related to the different accounting systems, including the design and implementation of MA techniques (Decree 18, 1974, rule 1).

Thus, the responsiveness of the SPCs to the SCS rules would be dependent on the consciousness of supervisory authorities indicated by the frequency and interest in SCS reports related to their SPCs. Responsiveness is also likely to be dependent on the support received from supervisory authorities.

Oliver labeled the source of pressure as 'control' (1991: 160). She argues that organizations tend to conform to institutional pressures when legal coercion is high, while when the degree of enforcement is low, organizations tend to resist the change and exhibit low conformity (Oliver, 1991: 167-168).

Case study evidence in a large Spanish electricity company suggests that 'regulatory environment (coercive isomorphism)' has had an impact on the implementation of accounting information system in the company (Tsamenyi *et al*, 2006: 428). It is hypothesized, therefore, that

**H1-1:** *There is an association between the level of coercive pressures exerted on SPCs by the supervisory authority upon which they are dependent and the extent of use of SCS in those companies.*

While the null hypothesis related to this variable is

**H1-0**: *There is no association between the level of coercive pressures exerted on SPCs by the supervisory authority upon which they are dependent and the extent of use of SCS in those companies.*

Previous research reflected institutional relations by asking respondents to evaluate the constraining and quality aspects of the relation with major institutional constituents in their environment (Oliver, 1997: 120-121). This measure however seemed not capable of reflecting the influence of supervisory authorities in SPCs context. The researcher, therefore, wanted to reflect better the pressure exerted on SPCs by supervisory authorities, based on items extracted from the fieldwork interviews.

The five initial items developed to measure this variable are shown in table (5-1) these items were subject to intensive analysis to assess the reliability of the final index before being used in hypotheses testing. Procedures for assessing reliability and the development of the indexes used in this thesis are presented in chapter (7).

**5-2-2-2 The impact of competitive pressures of technical environment:**

Early institutional theorists placed more emphasis on the external institutional forces, and neglected the impact of technical competitive environment on isomorphism (DiMaggio and Powell, 1983).

As noted earlier there has been increasing recognition among some institutionalists that 'technical [competitive] and institutional environments should not be viewed as mutually exclusive states: they can and do coexist' (Scott and Mayer, 1991: 123) and that organizations in general work under pressures from both institutional and competitive environment (Oliver, 1997: 100; Tsamenyi *et al*, 2006: 412-413).

Competition explains part of the process of isomorphism (Carruthers, 1995: 317), and uncertainty in turns pushes organizations toward imitation (DiMaggio and Powell, 1983: 150-151).

Oliver argues:

*"Environments that are highly fragmented or purely competitive impede the spread of institutional consensus and conformity". (1991: 171)*

Research in MA shows those organizations that confront intense competitive market conditions 'tend to employ relatively sophisticated management accounting systems' (Drury and Tayles, 2000: 31).

Chenhall has stressed the need to explore the impact of both institutional and market derived pressures on the adoption of MA practices. He thinks:

*"The implications for management and MCS [management control systems] of global competition and operations are increasingly important." (2003: 139)*

As mentioned earlier, in SPCs context, researchers have noted that the environment where these companies operate has become more competitive with the considerable increase of the role of private sector in industry, and more importantly after Syria joined the Arab Free Market Zone agreement (Abdel Nour, 1999: 5; Al-Zaim, 2004: 7). As SPCs were required to use SCS by legal enforcement, and given the change in their competitive environment, they are likely, therefore, to respond to competitive pressures by adopting SCS. If the findings in the MA literature were held true in SPCs context, one would expect that the apparent increase in the technical competitive environment pressures in SPCs context would be associated with the extent of use of SCS. Thus it is hypothesized that:

**H2-1**: *There is association between the extent of pressures exerted on SPCs by elements of technical (competitive) environment and the extent of use of SCS.*

While the null hypothesis related to this variable is

**H2-0**: *There is no association between the extent of pressures exerted on SPCs by elements of technical (competitive) environment and the extent of use of SCS.*

To measure the latent variable (technical competitive pressures) the researcher asked respondents to indicate their agreement with 5 items, which describe the characteristics of environmental competition. Previous research referred to the same indicators used in this thesis, but did not ask respondent to assess all the aspects of their competitive environment (Mia and Clarke, 1999: 139; Westphal *et al*, 1997: 380).

The researcher intended to allow respondents to assess the different aspects of their competitive environment and use a composite variable, rather than using one indicator to measure this construct. The five items initially developed to measure the latent composite variable "technical competitive pressures" as shown in table (5-1) were then tested for the reliability to select the final items included in the index that measure this variable as discussed in chapter (7).

### 5-2-3 Hypotheses related to the association between intra-organizational willingness factors and the extent of use of SCS in SPCs:

In order to respond to pressuring constituents, organizations should have motives toward conformity. Motives, however, may differ and institutional and economic oriented approaches have differed in the motives they ascribed to organizations that lied behind their responsiveness to external environment (Oliver, 1997: 100; Roggenkamp et al, 2005). It is also increasingly recognized by some MA authors that there are different motives for using MA information (Drury, 2004: 711-716).

Oliver distinguished between two motives and named them 'cause' indicating the reason behind response to institutional pressures (1991: 160-161).

Three main motives of MA change have been considered in this research as discussed below.

### 5-2-3-1 Legitimacy:

According to institutionalists legitimacy is one of the main motives that affect the organizational conformity with institutional rules of behavior (Meyer and Rowan, 1977: 348; DiMaggio and Powell, 1983: 148; Zucker, 1987: 443; Oliver, 1997: 100).

> *"Adoption of these legitimated elements, leading to isomorphism with the institutional environment, increases the probability of survival." (Zucker, 1987: 443)*

Legitimacy is identified in this thesis as it refers to organizations' concerns of social acceptance and satisfying pressuring constituents in order to avoid the questioning and sanctions (DiMaggio and Powell, 1983: 148); and their 'attention to other organizations' practices in their field (Ingram and Simons, 1995: 1479).

Oliver (1991: 161) argues that when organizations perceive that the legitimacy, which they would get from conformity to institutional rules, is high, they are likely to show high compliance with such rules.

In organization theory research, Ingram and Simons found that securing legitimacy, manifested by the attention given to the practices of other organizations, had a positive effect on the extent to which organizations responded to work-family issues (1995: 1479).

Case study evidence from MA research regarding the adoption of ABC in a Portuguese telecommunication company suggests that one of the criteria, which

the commercial mangers in this company relied on to adopt ABC, is 'satisfying external constituents' (Major, and Hopper, 2005: 223). Drury, mentions that accounting information may be used by managers ceremonially 'for symbolic purposes' regardless of there economic benefits (2004: 713).

Given the apparent coercive pressures from supervisory authorities and government mandates, which required the use of SCS in SPCs, it is expected that some SPCs would perceive compliance with the supposed supervisory authorities' pressures as increasing their legitimacy in the eyes of these pressuring bodies. Thus it is hypothesized that:

**H3-1**: *There is association between the extent of legitimacy perceived attainable by SPCs from conformity to SCS rules and the extent of use of SCS.*

The null hypothesis related to the above alternative hypothesis is:

**H3-0**: *There is no association between the extent of legitimacy perceived attainable by SPCs from conformity to SCS rules and the extent of use of SCS.*

The researcher developed three items, which describe the legitimating behavior of organizations in order to measure the latent composite variable "perceived legitimacy". The items were extracted from the MA and organization theory literatures (Major and Hopper, 2005: 223; DiMaggio and Powell, 1983: 148; Ingram and Simons, 1995: 1479) and fieldwork visits as shown in table (5-1). The initial items were then tested for reliability in order to define the indicators that should be retained in the final index and validate their combination to measure this variable as discussed in chapter (7).

**5-2-3-2 Perceived self-interest:**

Self-interested behavior seems not clearly theorized by institutional theory supporters (Oliver, 1991: 149). According to Oliver 'political self-interest among organizational actors that are at cross-purposes with the institutional objectives' (1991: 159), bound the willingness of organizations to accede to institutional demands.

Thus internal actors would be more likely to conform to institutional requirements if they considered such conformity as serving their own self-interest. Research in MA has referred to the power conflicts that emerge within organizations, which might affect the change in the MA practices (Puxty and Lyall, 1989: 11; Major and Hopper, 2005: 226; Modell, 2002: 665; Tsamenyi *et al*, 2006: 428).

As one of the management control systems, for SCS, to be adopted, it is necessary that cost standards be linked to an efficient rewards system (Otley, 1987: 8). Standards of performance would be subject to more resistance if internal actors were not motivated to use these standards, (Horngren and Sundem, 1990: 216; Watts, 1993: 605; Drury, 1996: 639) or if they considered them at cross-purposes with their own self-interest.

Drury cited Williamson's (1964) claim that 'managers are motivated to achieve two sets of goals- the firm's goals and their own personal ones' (1996: 638-639).

Burns and Scapens insist that 'competing interests' might be a key cause of resistance to institutional change (2000: 17).

It follows that in SPCs context and given the criticisms by several researchers leveled at incentive systems and lack of accountability (Salama, 2000: 5, Al-

Khouder, 2004: 19) it is likely that standard costs would be confronted by some resistance from internal actors, thus it is hypothesized:

**H4-1**: *There is association between the extent of self-interests perceived to be attainable by internal actors in SPCs from adopting SCS, and the extent of use of SCS.*

While the null hypothesis is:

**H4-0**: *There is no association between the extent of self-interests perceived to be attainable by internal actors in SPCs from adopting SCS, and the extent of use of SCS.*

Three indicators, which have been extracted from the literature (Puxty and Lyall, 1989: 11; Major, and Hopper, 2005: 226) and from fieldwork visits (see table 5-2) were used to measure the latent composite variable "perceived self-interest" as presented in table (5-1). The initial items were then tested for reliability in order to define the final items that should be retained in the final index and validate their combination to measure this variable as discussed in chapter (7).

**5-2-3-3 Perceived economic gains:**

This motivation is derived by the willingness of internal actors to achieve better economic results and attain more efficiency. Efficiency was considered as the main incentive of organizational change by contingency theorists such as Thompson (1967); an assumption rejected by institutionalists who considered 'structural change in organizations seems less and less derived by competition or the need for efficiency' (DiMaggio and Powell, 1983: 147).

However, legitimacy does not necessarily conflict with achieving economic efficiency (Carruthers, 1995: 318; Roggenkamp et al, 2005: 2491). Case study evidence in MA research has found that both efficiency enhancing and legitimacy seeking are determinants of MA change (Modell, 2001: 457). Serving the

organizational goals and increasing economic fitness, therefore, is one of the major motivations that affect organizations' responsiveness to the institutional rules. Oliver predicts low conformity to institutional pressures in response to low perceived economic gains (1991: 161-162).

As is known in the SCS literature, organizations that adopt SCS seek to achieve certain economic gains, such as controlling and evaluating the performance of workers and different levels of management, and secure efficient use of resources (Batty, 1970: 161; Dopuch, Birnberg, and Demski, 1982: 210; Watts, 1993: 605; Drury, 2000: 765).

Thus in SPCs context, it is expected that the responsiveness of these companies to SCS rules, would be associated with managers' concerns of attaining economic gains from conformity. It is hypothesized therefore that:

**H5-1**: *There is association between the extent of economic gains perceived to be attainable by internal actors in SPCs from using SCS and the extent of use of SCS.*

While the null hypothesis is:

**H5-0**: *There is no association between the extent of economic gains perceived to be attainable by internal actors in SPCs from using SCS and the extent of use of SCS.*

Three indicators were extracted from the literature (Batty, 1970: 161; Dopuch *et al*, 1982: 210; Watts, 1993: 605; Drury, 2000: 765) and used initially to measure the latent composite variable "perceived economic gains" as presented in table (5-1). These items were then tested for reliability in order to define the final items that should be embodied in the final index as discussed in chapter (7).

### 5-2-4: Hypotheses related to the association between intra-organizational capacity factors and the extent of use of SCS in SPCs:

It is probably not enough for organizations to have a willingness to respond to institutional demands. It is equally important that they have the capability to respond. Three main aspects of intra-organizational capacity have been considered in this research, each of which is linked to a hypothesized relationship with the extent of use of SCS in SPCs as follows.

#### 5-2-4-1 The cognitive capacity (awareness):

This aspect of intra-organizational capacity is related to the knowledge that the different actors have acquired and their awareness about the institutional demands (in this case the use of SCS). As the historical analysis demonstrated (see chapters 3, and 4) knowledge of internal actors, the skills they acquired and level of training they received would affect the ability of organizations to use MA techniques (Burns and Scapens, 2000: 17; Burns & Vaivio, 2001: 396; Cagwin and Bouwman, 2002: 3; Connor, Chow, Wu, 2004: 355-356; Nouri and Parker, 1998: 470).

Drury argues that the main cause for the dysfunctional effects of accounting control systems seems to be the inaccurate managerial utilization of accounting information. He, therefore, thinks that:

> *"it is necessary to go one stage further and educate managers and employees in the appropriate use of accounting information, since it is unreasonable to expect them to use it in the appropriate manner when they have not had adequate education and training" (1996: 635-636).*

Burns and Scapens have thought that a key reason for resisting institutional change might be the 'lack of capability (knowledge and experience) to cope with such change' (2000: 17).

Sulaiman *et al* (2004) have cited Tho et al's (1998) interpretation for why traditional MA practices are still widely used in developing countries, compared to the more innovative practices. The authors thought it might be because of 'the lack of awareness of new techniques' (2004: 505).

Major and Hooper have found that among other factors that facilitated the implementation of ABC in their case study is education and training provided to the employees (2005: 226).

Hence the ability of organizations to conform to the institutional pressures would be affected by their cognitive capacity.

Oliver argues that among other factors:

> *"lack of recognition or awareness of institutional expectations limit the ability of organizations to conform to institutional requirements" (1991: 159).*

Given the lack of training and qualified staff and lack of experience in SPCs, as claimed by some Syrian critics (Salama, 2000: 5; Fakher, 1993: 113), it is expected that the level of knowledge acquired by different actors in SPCs about SCS, hence the cognitive capacity of those companies would affect the extent of use of the technique. Thus it is hypothesized:

**H6-1:** *There is association between the extent of cognitive capacity of internal actors in SPCs about SCS and the extent of use of SCS.*

While the null hypothesis is:

**H6-0:** *There is no association between the extent of cognitive capacity of internal actors in SPCs about SCS and the extent of use of SCS.*

Six items were initially developed relying on the literature (Drury, 1996: 635-636; Nouri and Parker, 1998: 470, Burns & Vaivio, 2001: 396; Burns and Scapens, 2000: 17; Cagwin and Bouwman, 2002: 31) to measure the latent composite variable "cognitive capacity" as shown in table (5-1). The initial items were then

tested for reliability and validity to define the final items for inclusion in the index that measures this variable as discussed in chapter (7).

**5-2-4-2 Organizational capacity:**

This aspect of intra-organizational environment is related to the availability of the key resources and managerial capabilities, which are considered important for the use of SCS.

As the historical analysis has shown, the lack of cooperation between different managerial levels, lack of qualified management, the availability of skilled technical staff, and the availability of sufficient technological resources would affect the ability of organizations to use SCS (Batty, 1970: 49; Edwards *et al*, 2002: 31; Maurice L. Hirsch, Jr., 2000: 348; Kaplan & Cooper, 1998: 38; Puxty and Lyall 1989: 34). Several authors have referred also to the relevance of top management support and the impact of management inertia in impeding the change in MA practices (Sulaiman et al, 2004: 505; Waweru et al, 2004: 690; Major and Hooper, 2005: 226).

Inadequate organizational resources and managerial capabilities therefore might limit the ability of organization to accede to institutional expectation (Oliver, 1991: 159).

Given the comments of some Syrian authors regarding the technological and managerial capabilities of SPCs (Salama, 2000: 4; Sukkar, 2004: 4 –7), one would expect that the level of organizational capacity of SPCs might be associated with the extent of use of SCS, thus it is hypothesized:

**H7-1:** *There is association between the extent of organizational capacity of SPCs and the extent of use of SCS.*

While the null hypothesis is:

**H7-0:** *There is no association between the extent of organizational capacity of SPCs and the extent of use of SCS.*

Seven items were initially developed relying on the literature (Batty, 1970: 49; Puxty and Lyall 1989: 34; Kaplan & Cooper, 1998: 38; Hirsch, 2000: 348; Cagwin and Bouwman, 2002: 31) and interviews to measure the latent composite variable "organizational capacity" in addition to the organizational size as shown in table (5-1). The initial items were then tested for reliability to define the final items that should be retained in the final index that measure this variable as discussed in chapter (7).

**5-2-4-3 Suitability of technological task requirements (Technological environment):**

This aspect of intra-organizational factors relates to the technological characteristics of the task or technique under consideration. Contingency theorists have considered type of technology as one of the contingent factors affecting the characteristics of MA system (Chenhall, 2003; Drury, 2004).

Chenhall identified technology as it refers, in general, 'to how the organization's work processes operate (the way tasks transform inputs into outputs)' (2003: 139). MA scholars have considered certain manufacturing traits as suitable to the use of SCS. Such characteristics include; the repetitiveness of operations, producing limited number of standardized products and clear relationship between input and output (Dopuch *et al*, 1982: 208; Drury, 1998, 2004; Fray *et al*, 1998: 507; Kaplan & Cooper, 1998, Kaplan & Atkinson, 1998: 294-295).

Kaplan and Atkinson have mentioned some important technological characteristics of operations where SCS is likely to be suitable.

*"Usually, we think of standard cost centers as arising in manufacturing operations in which, for each type of output product, a standard amount and standard price of input materials, labor, energy, and support services can be specified. Standard cost centers, however, can be used for any repetitive operation for which we can measure the physical amount of output and specify a production function relating inputs to outputs" (1998: 294).*

The authors also have insisted that 'The product (or output) must be standard enough' (Kaplan & Atkinson, 1998: 295) to allow the specification of standards. Thus it is likely that the introduction of SCS in an unsuitable environment would face resistance to the system. This research, however, focuses on manufacturing SPCs that are more likely to use SCS (Drury, 1998, 2004). Yet differences in technological manufacturing characteristics might still exist between SPCs, and affect their capacity to use SCS.

Thus it is hypothesized that:

**H8-1:** *There is association between the suitability of technological task requirements related to SCS and the extent of use of SCS in SPCs.*

While the null hypothesis is:

**H8-o:** *There is no association between the suitability of technological task requirements related to SCS and the extent of use of SCS in SPCs.*

The researcher initially developed 4 items, which have been extracted from the literature that describe the technological conditions under which the use of SCS was considered as suitable (Dopuch *et al*, 1982: 208; Frey et al 1998: 523; Drury, 2000: 672; Kaplan & Atkinson, 1998: 294-295) in order to measure the latent composite variable "task requirements" as shown in table (5-1). The initial items were then tested for the reliability and validity to define the final items that should be retained in the final index that measures this variable as discussed in chapter (7).

**Table (5-1) the dependent and independent variables and methods of measurement**

| Variables | Method of Measurement (original items) |
|---|---|
| **Dependent variable** | |
| The extent of use of SCS | Three point Likert scale ranging from "1" not in use "2" partially used "3" extensively in use |
| **External Independent variables** | |
| **1-Institutional coercive pressures (Impact of supervisory authority)** | Construct consists of 5 items measured using 7 point Likert scales ranging from 1 strongly disagree, to 7 strongly agree |
| Supervisory authority has been serious in introducing SCS | |
| Company has received supervisory authority support | |
| Supervisory authority frequently requires SCS reports | |
| Supervisory authority has required the use of cost standards in the industry | |
| Supervisory authority has had considerable impact on the decision to use SCS | |
| **2- technical competitive pressure (Impact of technical environment)** | Construct consists of 5 items measured using 7 point Likert scales ranging from 1 strongly disagree, to 7 strongly agree (Mia and Clarke, 1999: 158) |
| Your company operates in a competitive environment | |
| There is a large number of competitors in the market for your main products | |
| Price competition is intense in your industry | |
| Your company faces quality challenges from competitors | |
| Your company faces customer service challenges from competitors | |
| **Intra-organizational capacity independent variables** | |
| **3-Cognitive capacity (awareness)** | Construct consists of 6 items measured using 7 point Likert scales ranging from 1 strongly disagree, to 7 strongly agree |
| Your staff have received a good training on how to use SCS | |
| Your staff have good experience on how to use SCS | |
| Top management has good knowledge of SCS | |
| Middle management has good knowledge of SCS | |
| Accountants have good knowledge of SCS | |
| Company has received SCS consultancy from SCS experts | |
| **4-Organizational and managerial capacity** | Construct consists of 7 items measured using 7 point Likert scales ranging from 1 strongly disagree; to 7 strongly agree in addition to size measured by the number of employees |
| | |

| | |
|---|---|
| Top management has shown good support for introducing SCS | |
| Management inertia has delayed the use of SCS | |
| Lack of scientific management | |
| Lack for qualified technical staff (Engineers) | |
| Lack for co-operation between technical and accounting staff | |
| Company has computerized its costing system | |
| Out of date manufacturing technology causes resistance to the use of SCS | |
| Size | Number of employees (grouped) |
| **Intra-organizational willingness independent variables** | |
| **5-Perceived legitimacy** | Construct consists of 3 items measured using 7 point Likert scales ranging from 1 strongly disagrees to 7 strongly agree. |
| Top management willing to use SCS because other companies in the same industry do so | |
| Top management willing to use SCS to satisfy supervisory authority | |
| Top management willing to use SCS to avoid questioning | |
| **6- Perceived economic gains** | Construct consists of 3 items measured using 7 point Likert scales ranging from 1 strongly disagree, to 7 strongly agree |
| Top management willing to use SCS to improve efficiency | |
| Top management willing to use SCS to control managers | |
| Top management willing to use SCS to control workers | |
| | |
| **7-Perceived self-interest** | Construct consists of 3 items measured using 7 point Likert scales ranging from 1 strongly disagree, to 7 strongly agree |
| Lack of personal financial incentive makes top management unwilling to use SCS | |
| Lack of personal financial incentive makes middle management unwilling to use SCS | |
| The fear of holding responsibility makes top management unwilling to use SCS | |
| **8- Task requirements** | Construct consists of 4 items measured using 7 point Likert scales ranging from 1 strongly disagree, to 7 strongly agree |
| The production process consists of repetitive operations. | |
| Your company produces limited number of products | |
| Your company produces standardized products | |
| There is a clear relationship between inputs and outputs in your company | |

## 5-3 The development of the research instrument

Having identified the research hypotheses, the dependent and independent latent variables and how they have been operationalized, this section proceeds by discussing the different procedures adopted in the development of the instrument used in this thesis.

It should be noted that developing the research instrument was based on the early stages of the research including historical analysis and fieldwork visits. These first steps also facilitated the formulation of the research hypotheses and variables measurement, as discussed in the last section. The following subsections will discuss the different stages in developing the survey instrument used to collect the main data.

### 5-3-1 Instrument development, preliminary stage:

As noted earlier, given the limited body of knowledge available in the literature in Syria concerning the practice of SCS, and to facilitate the extraction of the influential factors that affected the use of SCS, the researcher started by tracing the historical development of SCS in general from the perspective of the suggested theoretical framework. This allowed the researcher to grasp the general debates concerning the development and practice of SCS, and the different institutional and intra-organizational factors that seemed to affect this practice.

The researcher then moved to a more precise inquiry to investigate the development of SCS practice in SPC context. The lack of knowledge about SCS practice in Syrian MA research, led the researcher to consult some research materials from other disciplines, such as economics, and other historical materials and legislations. This helped to illuminate the SPCs context in which SCS has

been institutionally induced, and cast light on outstanding institutional and intra-organizational factors, which could be examined for the association with the extent of use of SCS in SPCs. Indicators were extracted from this analysis and guided the subsequent stages in development of a survey instrument.

### 5-3-2 The development of the research instrument, the stage of fieldwork visits:

De Vaus notes that when a special group is studied:

> *"it is very helpful to use a less structured approach to data collection first (e.g. observation, unstructured interview). This can help us understand things through the eyes of those people, learn of their concerns and ways of thinking, and this can be extremely helpful in developing relevant and appropriately worded questions for that group"* (1996: 53).

Thus, having grasped the different debates in the literature concerning the development and practice of SCS and the potential influential factors, as discussed in chapters 3 and 4, and given the theoretical framework adopted, the researcher moved to explore the practice in SPC context through fieldwork visits. The aim of these visits was to gain insight into the technique in SPCs that used the system, and for those companies, which did not use SCS, to explore why they do not use it. This in turn could guide the researcher to more precise inquiry and helped in developing the research instrument. Interviews were held in September 2004 at three different levels as will be discussed below.

#### 5-3-2-1 At the level of Ministry of Industry in Syria:

The researcher sought to understand perceptions from the higher supervisory authority regarding the factors that influenced the introduction of SCS into SPCs. One interview was held with the Head of the Costs and Financial Studies Department in the Syrian Ministry of Industry. This department represents a

central department in the Ministry of Industry, which follows up and supervises the application of the different financial legislations in the general industrial organizations and their subsidiaries. This interview enabled the researcher to understand the higher supervisory authority perceptions of the factors affecting the non-use of SCS. A list of all SPCs and their addresses was also obtained and this facilitated the subsequent stages of the research. The interviewee also provided instructions to two SCS user companies.

**5-3-2-2 At the general organizations level:**

The general organization is a public entity that holds the responsibility for co-ordinating and supervising the activities of several SPCs, which belong to the same or integral type of industries.

Thus, the researcher had the impression that interviewing some people in one of the public organizations might illuminate some aspects of the factors that influenced the introduction of SCS in SPCs.

The general organization of the tobacco industry has been chosen for inclusion in this fieldwork. The choice was based on ease of accessibility and the travelling costs.

The organization had been unsuccessful in introducing the system in its subsidiaries. An interview with the Cost Department manager in this organization allowed the exploration of some reasons for the failure to spread SCS in the industry.

**5-3-2-3 At the SPC level:**

Semi-structured interviews were held; with 5 financial controllers in 5 public companies. The criterion for the selection of the companies relied on the ease of accessibility and on information from the Head of the Costs and Financial Studies Department at the Ministry of Industry, who suggested the names of two companies, which used the SCS.

Two open questions were designed to explore the perceptions of interviewees regarding the factors that might have affected the extent of use of SCS.

Interviewees in the three companies that do not use SCS (non-users) were asked why a system of standard costing is not in use and to list the factors that they believe have affected the non-use. They were also asked how a scientific application of SCS could be achieved in their companies and to list the factors that might enable such implementations (See appendix A). The semi-structured questionnaire contained questions that aimed to explore the practice in the companies that use the system (Users) and formed a main part of the final questionnaire.

The perceptions of the interviewees at the different levels, discussed in this section, regarding the factors that seemed to influence the use of SCS, were summarized in a form of indicators and classified into four main themes as shown in table (5-2).

As the table shows, variables indicated by the groups of interviewees, (users, no-users, general organization and Ministry of Industry) as influencing the use of SCS were classified into four main themes (influential factors).

**Table (5-2): The extracted themes and indicators from fieldwork visits**

| Themes-Influential factors | Indicators of factors influenced the use of SCS | Groups of interviewees |
|---|---|---|
| **External coercive Pressure** | | |
| | Lack of seriousness of supervisory Authority | Non-users and G. O. |
| | Lack of support from supervisory authority | Non-users |
| | Supervisory authority required the use of SCS | Users and G. O. |
| | Contradictory regulations (labour) | Users |
| **Technical and Voluntary pressures** | | |
| | None of the companies hire professional accountants. | Non-users and users |
| | There is a difficulty in predicting resource prices. | Users |
| | Lack of market sense by management | Users |
| | Increasing competitive environment | Non-users and users |
| **Intra-organizational capacity factors** | | |
| | Lack of Training | Non-users and G. O. |
| | Lack of Knowledge of accountants | Non-users |
| | Lack of experience | Non-users |
| | Lack of qualified staff | Non-users and G. O. |
| | Management inertia | G. O., Ministry, Non-users |
| | Carelessness of Management | Non-users |
| | Lack of qualified management | Non-users |
| | Lack of co-operation | Non-users |
| | Lack of SCS software | Non-users and users |
| | Lack of manufacturing technology | Non-users |
| **Intra-organizational Willingness factors** | | |
| | The system has been introduced to satisfy supervisory authority | Users |
| | Managements unwilling to use the system | Ministry and G. O. |
| | Fear of holding responsibility | Non-users and G. O. |
| | Escape from applying the system | Non-users, Ministry and G. O. |
| | Staff in SPCs should be warned for the economic benefits of SCS | Ministry |

This typology corresponds with the theoretical framework, which relied on the combination of external institutional and technical factors and the two dimensions of intra-organizational factors related to the willingness and capacity to use SCS. (See figure 2-2 chapter 2).

As far as how SCS has been used in SPCs is concerned, the interviewees in the two user companies mentioned detailed deployment of standard rates of usage of merchandised requirements (direct material) where variances (quantities) in the actual usage from those standards are reported annually. None of those companies used any other types of standards neither did they report any other type of variances, only direct material quantity variance. Detailed budgeting system is used to control the other costs elements in addition to some financial and non-financial performance measures (such measures covered productivity, efficiency, liquidity and profitability, and compared the year of concern with previous year(s), and the development rates were also calculated). The types of standards used and the variances reported seem to have a linkage with the contradictory regulations as one of the interviewees has mentioned:

"***Standards of merchandized requirements*** *[materials] have been established, with* ***the help of general organization*** *of sugar industry. However, this cost item is the only item for which we have developed standards. [Why] well our company, as the other public companies, has been for a long time operating to serve mainly social objectives in addition to economic objectives of achieving high efficiency and profitability . But the supervisory authorities employment policy, which I would summarize with the famous fable that says 'the food of one person would be sufficient for two' has created* ***over-manning****, while applying the system to control labour requires a scientific identification of the quantity and qualifications of the work force required to achieve the production plan.*"

The interviewee in the second company has shared the same idea but added:

*"The employment sometimes is imposed on us by supervisory authorities and wage regulations rendered labour cost to be fixed in nature, because the employees usually appointed in their positions with a fixed monthly wage, so this item is less controllable through standards."*

The interviews in the users companies indicate a partial use of SCS with the institutional elements (contradictory regulations) seem to have an impact on how SCS has been implemented.

The implications of the collected qualitative data, as summarized in table (5-2), is that both institutional and intra-organizational factors seem to impinge on the use of SCS, which in turn suggests an interplay between the institutional and intra-organizational capacity and willingness factors in shaping the use of SCS in SPCs. Qualitative data suggests also a partial use of SCS as a consequence of some institutional elements.

The researcher wished to explore the implications gained from the qualitative data collected (historical analysis and fieldwork visits) in a relatively larger sample of SPCs using a more systematic instrument. Thus, indicators shown in table (5-2) and insights gained from exploring the practice helped in formulating the research hypotheses, operationalizing the main variables in this research and in the construction of the questions used in the main questionnaire.

### 5-3-3 Development of the research instrument, the main questionnaire design

At the last stage and having identified the indicators to be used in the operationalization of the main variables, based on literature search and fieldwork visits, the researcher designed the final questionnaire.

The questionnaire was divided into three main parts: The first part aimed to collect demographical data about the survey respondents. This part covers questions one to seven and aimed particularly to facilitate the assessment of sampling and response bias, and provides information about the competence of the participants.

The second part aimed to gather data about the main variables of interest, concerning the extent of use of SCS, and SPCs' perceptions about the impact of the identified external and internal factors that might have association with the extent of use of SCS in their companies. This part includes the questions from eight to twelve. Indicators included in these questions were extracted from the historical analysis and from the fieldwork visits as mentioned in the last subsections.

The third and last part covered the practice of SCS in SPCs. The majority of questions in this part of the questionnaire were adopted from previous surveys in other countries, particularly Drury *et al*'s (1993) survey of UK firms, so that the findings of this research can be compared with those in other countries. This section included also two questions (19 and 21), which aimed at illuminating potential factors that might impinge upon the way in which standard costs and variance analysis have been used in those companies. Question 21 intended also to explore the other MA practices in use in the companies that adopted SCS.

The questionnaire contained, additionally, a covering letter that discussed the aims of the research and assured the confidentiality of the information provided by participants.

The last two pages of the questionnaire provide brief definitions for the different terms used in the questionnaire to allow respondents to gain understanding about all the issues addressed in the questions they were asked to answer.

To validate the form of the questionnaire the researcher sought feedback from colleagues and academic staff, particularly his supervisor. Some changes were made regarding the wording of some questions.

To further validate the instrument, and given the small size of population, which made it difficult to conduct a further piloting, as will be discussed later, the researcher asked two of the interviewees, who took part in the fieldwork, to fill in the questionnaire and to indicate their comments on any issue that would improve the instrument. One suggestion was that, it is better to make the scale seven points rather than five point as it was initially. Interviewees thought for some statements they are slightly disagreeing or agreeing rather than completely disagreeing or agreeing. The researcher then decided to change the scales, used to measure the different variables in the second section of the questionnaire accordingly.

The final form of the research instrument is presented in appendix (B). The next section describes the sampling and data collection procedures.

## 5-4 sampling and data collection procedures:

This section discusses the selection of research design, the identification of the research population, and sampling and data collection procedures.

### 5-4-1 Research design:

The research design adopted in collecting the data was the cross-sectional design. Choosing this design has been affected by the aims of the thesis the knowledge available about the phenomenon under investigation, and time constraints.

According to Oppenheim, when little is known about the main causal variables in the area of inquiry and no causal inference is possible, only associations 'Here we

find the simple cross-sectional design' (1992: 35). It has been argued that 'cross-sectional design is the most recognizable research design in social research' (David & Sutton, 2004: 135). In such design, where little knowledge is available about the subject, data is collected at one point in time (Burton, 2000: 296); it is therefore necessary to be carefully thought through. As such the researcher has to gain sufficient knowledge about the topic through extensive literature review and his experience (David & Sutton, 2004: 135). The selection of this design was also affected by the time and resource limitations, because longitudinal research design, which relies on studying the change and the development of a phenomenon over time, is resource demanding and time consuming (Saunders *et al*, 2000: 96).

**5-4-2 Research population:**

Examining cross-case patterns requires the identification of a set of relevant cases (population). Populations in diversity approach are flexible and subject to revisions during the research process (Ragin, 2000: 45). However, it is necessary to delineate the boundaries of the research population at the beginning of the research, because generalizability of conclusions drawn from comparative research will be limited if the cases are not selected carefully and the population, from which they are chosen, is not specified properly (Schneider and Wagemann, 2003: 8). Moreover, the application of statistical techniques requires the identification of research population from which a random selection of a sample can be made.

The population of concern in this research is all SPCs that are clearly manufacturing and work under the supervision of ministry of industry. Thus, non-

manufacturing public companies were excluded from the research. The selection of this population was based on three facts:

1-SCS has been considered most suitable for manufacturing firms (Drury, 2000: 672). As the practice of SCS has not been well explored in SPCs, it seemed better to address the topic on a population where the system is more likely to be found. Moreover, addressing the topic on manufacturing firms helps also the researcher in controlling partially the impact of industry differences on the adoption of SCS. Thus, differences in the extent of use of SCS found in this investigation would not be related to the industry type, but to the main variables of concern measured in this research.

2- Given that all manufacturing SPCs are supervised by the Ministry of Industry in Syria, the chosen population facilitates the identification of sampling frame because, by the date of data collection, there was no single database that embodies the names and addresses of all Syrian public companies (manufacturing and non-manufacturing) from which one can select a random sample. However, it was possible to obtain the names and addresses of the companies that work under the supervision of Ministry of Industry. Moreover, being under supervision from Ministry of Industry, entails that all manufacturing SPCs are, in theory, under pressure to follow the coercive government's mandate, which required the use of SCS.

3- Managerial reform of the public industrial sector has attracted the interest of many Syrian researchers in recent years (Abu-Sekkeh, 2004; Al-Khouder, 2004; Mareinden, 2002; Salama, 2000). Given that MA is one of the essential tools of more scientific management, addressing the practice of standard costing on industrial SPCs and the different factors associated with the extent of use of this

technique, would contribute to the efforts of reforming this sector. This was one of the considerations in selecting this population for investigation in this research.

The list of SPCs embodied (96) companies, which were classified into seven groups of industries and representing all SPCs that are manufacturing firms and supervised by Ministry of Industry. Table (5-3) lists the distribution of SPCs population into the different general industrial organizations and the number of manufacturing companies supervised by each organization.

**Table (5-3) the distribution of SPCs population into the different GO based on industry types**

| General organization (G.O.) according to the type of industry | Number of manufacturing companies |
|---|---|
| G.O. for Chemical Industries | 13 |
| G.O. for Cement Industries [4] | 9 |
| G.O. for Sugar Industries | 9 |
| G.O. for Tobacco Industries [5] | 3 |
| G.O. for Textile Industries | 27 |
| G.O. for Engineering Industries | 13 |
| G.O. for Food Industries | 22 |
| Total | 96 |

The size of the population and the costs and time constraints have had their effect on the selection of a suitable sampling method, and the data collection strategy for this research.

Bryman and Cramer have justified sampling and state that,

> *"some populations can be very large, and it is unlikely that all units in a population can be included because of the considerable time and cost that such an exercise would entail" (2001: 96).*

[4] Two other supportive unites are also supervised by GO of cement, professional training unit, and repairs unit.
[5] Three main branches supervised by GO of tobacco, southern, northern and coastal area branches.

In general researchers want their sample to be representative of the population from which it has been selected. However, 'It is rare that perfectly representative samples can be created' (Bryman and Cramer, 2001: 97).

The representativeness of the selected sample was one of the major concerns for the researcher during the sampling procedures as discussed below, although set-theoretic methods used to analyze data are credited for being able to analyze small and mid sized data sets.

### 5-4-3 Sample selection

The literature suggests different sampling methods, which fall into two broad categories, probability or random sampling and non-probability sampling (see Babbie, 2001: 178, Hussey and Hussey, 1997; De Vaus, 1996: 60). While the latter category shows no consideration for representativeness, the former is highly reliant on the selection of representative sample, which means that 'the sample closely approximates those same aggregate characteristics in the population' (Babbie, 2001: 184).

Representative sample can be achieved through the random selection of cases, which in turn indicates that 'each element has an equal chance of selection independent of any other event in the selection process' (Babbie, 2001: 186).

Random sampling is, therefore, recommended in quantitative research as many of the statistical tests assume that data was gathered using random sampling (Bryman and Cramer, 2001: 97; Creswell, 2003:156).

Thus, the researcher aimed at selecting a random sample, as it is more likely to be representative of the population from which it has been selected. This in turn would enable the use of some statistical techniques to test the research hypotheses

and explore the most relevant variables on one hand; on the other hand it would also enhance the generalizability of the findings of set-theoretic methods (QCA and fuzzy set).

The literature suggests four main probability-sampling methods; simple random sampling, systematic sampling, stratified sampling and cluster sampling (see Bryman and Cramer, 2001: 97, De Vaus, 1996: 61-70).

In the case of SPCs the population size imposed difficulties in adopting a suitable sampling method and data collection strategy. The small population size might suggest that all companies could be contacted through mail questionnaires.

However, there is here the threat of low response rate, as many researchers recognized the fact that 'response rates to sample surveys are often quite low and are declining' (Bryman and Cramer, 2001: 97). Hussey and Hussey indicate that 'response rates of 10 per cent or less are not uncommon and this introduces the problem of sample bias' (1997: 163).

Moreover there is no indication in the literature in Syria of a possible response rate. A response rate of 20% would result in only about 20 cases even if questionnaires were posted to the whole population. As 30 cases, is generally considered necessary for statistical analysis (Saunders *et al*, 2000:155), a postal questionnaire was considered risky.

The best strategy, therefore, would be to choose data collection method that would yield high response rate. Telephone interviews could be a choice; however the length of the questionnaire and the high costs that would result from contacting all the companies was one of the constraints that led the researcher to exclude this

strategy. Furthermore, direct phone numbers of the intended interviewees were not available, but only "general information office" contact numbers, which made conducting telephone interviews more costly and time consuming.

The best way seemed to be to deliver the questionnaire personally. This would allow the aim of the study to be discussed with selected respondents and should increase the response rate. However, this method for the whole population would mean visiting (96) companies scattered in about 10 cities around Syria.

Thus another strategy to minimize travailing costs and secure randomness is to use a random sampling method that considers the geographical separation of the targeted companies. Cluster sampling seemed to be the best sampling method to adopt in order to select a random sample in this research, because the other probability methods 'do not deal very well with geographically dispersed populations' (Bryman and Cramer, 2001: 99). It is, therefore, the desire to lower the data collection costs, which is one of the main advantages of cluster sampling (Moser, and Kalton, 1972: 101), and the type of data collection strategy, which led the researcher to select this sampling strategy.

Cluster sampling has been considered a suitable sampling method, particularly in face-to-face surveys (De Vaus, 1996: 108). It involves 'random selection from a sampling frame listing groups [clusters] of units rather than individual units' (Hussey and Hussey, 1997: 146). Within the sample of selected clusters either all the subjects are contacted or another sub-sample from the selected sample of clusters can be chosen randomly (Moser and Kalton, 1972: 118).

As noted above the researcher firstly got a list of the names and addresses of all SPCs, which work under the supervision of the Ministry of Industry in Syria. This allowed the identification of the geographical location of each company.

Table (5-4) shows the distributions of SPCs to the four main geographical areas in Syria. To further facilitate data collection and reduce travelling costs these four geographical areas were classified into two clusters.

The first cluster (A) contains those companies, which are located in the western, middle, and southern areas and accounted for (53) companies; the second (B) contains those companies that are located in the northern and eastern areas and accounted for (43) companies.

**Table (5-4) the distribution of SPCs based on geographical locations**

| Geographical areas | Total population of SPCs | |
|---|---|---|
| | Count | % |
| Middle and west | 20 | 20.8% |
| East | 22 | 22.9% |
| South | 33 | 34.4% |
| North | 21 | 21.9% |
| Total | 96 | 100.0% |

Companies included in each cluster were easily accessible and relatively close to each other, thereby travelling costs could be reduced to the extent that the researcher could sustain. This, in turn, made contacting all companies in each cluster, if any of the two clusters were selected, possible given the time and resource limits available.

As Bryman and Cramer state:

*"the researcher almost always works within time and resource constraints, so that decisions about sample size must always recognise these boundaries" (2001: 100).*

Before selecting any of the two clusters the researcher wanted to have a rough idea about the standard error associated with the two clusters.

Standard Error is a measure of accuracy of the estimates, usually affected by several factors such as the sample size, variability of the population and, to lesser extent, population size (Moser and Kalton, 1972: 71).

Clearly the small sample size leads to a high standard error. In general the larger the sample size the lower the standard error, hence the greater the level of accuracy (Babbie, 2001: 192).

Because the two clusters represent a considerable portion of the population, the population size becomes relevant in calculating the SE. For investigation of proportions (based on the binomial distribution) Moser and Kalton; (1972: 147) suggested the following formula to calculate the SE:

$$S.E. = \sqrt{[(1-n/N) * p(1-p)/n]}$$

Where (n) is the required sample size, (p) the proportion in the observed cases, (N) is the population size, and (SE) is the standard error.

To calculate the standard error, therefore, it is necessary to have some estimates about one of the attributes of the population. Thus based on the field visits where 5 companies were interviewed, and 2 companies of 5, (p= 40%), reported usage of SCS, and given the size of the two clusters (n.A=53, n.B= 43) and the population size (N=96) the researcher estimated the standard error (S.E ), for each of the two clusters, using the above formula as follows:

$$S.E.(A) = \sqrt{[(1-53/96) * 0.4(1-0.4)/53]} = 0.045$$

$$S.E.(B) = \sqrt{[(1-43/96) * 0.4(1-0.4)/43]} = 0.055$$

SE in the two clusters seems acceptable. A random selection of one of the clusters resulted in the selection of cluster (A), which covered "middle, western, and southern" areas of Syria and accounted for 53 SPCs.

Table (5-5) lists the distribution of SPCs population and the selected cluster sample according to the groups of industries

**Table (5-5) the distribution of SPCs population and the selected cluster sample according to the groups of industries**

| Group of industry | Selected sample | | SPCS Population | |
|---|---|---|---|---|
| | Frequency | Percentage Within sample | Frequency | Percentage Within population |
| **Chemical** | 8 | 15.1% | 13 | 13.5% |
| **Cement** | 4 | 7.5% | 9 | 9.4% |
| **Tobacco** | 2 | 3.8% | 3 | 3.1% |
| **Sugar** | 3 | 5.7% | 9 | 9.4% |
| **Engineering** | 10 | 18.9% | 13 | 13.5% |
| **Textile** | 15 | 28.3% | 27 | 28.1% |
| **Food** | 11 | 20.8% | 22 | 22.9% |
| **Total** | 53 | 100.0% | 96 | 100.0% |

The small sample size in this thesis might be seen a threat of accuracy of the findings. However, given that the selected sample represents a considerable fraction of the SPCs population, the population size becomes relevant in estimating standard error as discussed above (Moser and Kalton, 1972: 147; de Vaus, 1996: 71-72). Moreover, SE associated with the selected sample (0.0454) seemed acceptable. Furthermore, Moser and Kalton have argued that:

*"departure from the appropriate size means only that the intended precision is not obtained; it does not affect the validity of the survey results" (1972: 149).*

Accuracy is not the only factor when defining sample size, 'cost and time are also key factors' (De Vaus, 1996: 73; 2002: 83), which represented main constraints in this research. The sample size is, therefore, seen as a compromise between these different elements and is 'a matter of judgement rather than calculation' (Saunders *et al*, 2000: 155).

Given also that the intended QCA and fuzzy set analyses were originally invented as small data sets analytical tools, the size of the selected sample poses no technical difficulties on applying these techniques.

Throughout the chapters that deal with data analysis, SE will be reported, whenever it is necessary, to reflect the level of accuracy of the findings.

**5-4-4 Data collection and response rate:**

As discussed above the population size and the consideration of attaining high response rate to secure sufficient number of cases entailed a certain data collection strategy.

Data collection methods that rely on the presence of the researcher, such as face-to-face interviews and delivery and collection questionnaires, have been credited in the literature as yielding a high response rates (De Vaus, 1996: 107; Saunders *et al*, 2000: 311).

Data in this research was collected through hand-delivered structured questionnaires handed by the researcher to all SPCs in the selected cluster sample in June and July 2005.

Antonius noted, 'The questionnaires can be hand-delivered, or sent by mail' (2003: 27).

Hussey and Hussey mentioned,

*"If the sample is situated in one location, it may be possible to distribute, and collect, the questionnaires individually." (1997: 164).*

The researcher handed questionnaires to the suitable respondents in the selected SPCs. In all cases the researcher contacted, firstly the financial controllers as they represent the highest financial position in the SPCS' organizational hierarchy. They should be, therefore, the best respondents to answer the questionnaire, or

could direct the researcher to suitable persons, in the lower hierarchal level, who have sufficient experience and knowledge to answer the questionnaire. In the latter case either the account managers or cost department mangers were contacted.

Respondents were asked to read carefully the questionnaire and the instructions before filling it in, and if they have any difficulty to contact the researcher at the telephone number shown in the questionnaire. Another appointment was then made with each respondent to allow the collection of questionnaires.

During the data collection the researcher adopted a strategy to facilitate the distribution and the collection of the questionnaires, and to minimize cost and time required to collect the data. This strategy relied on contacting all the companies, which are situated in the same location or close to each other on the same day, and then an attempt was made to collect the questionnaires from all companies on another day.

Out of the 53 companies in the cluster sample 36 completed questionnaires were collected. Reasons for non-responding were:

1. Three public companies were not contacted because they took part in the fieldwork interviews (considered ineligible).
2. In four companies non-response was due to ceasing of activity because they changed their activities into other industries where the work is still under completion, or they recently merged with other companies.[6] (Considered ineligible).
3. In 10 companies non-response was due to the sensitivity of the data required which was considered very confidential, or because the respondents were too busy (eligible but refused or failed to participate).

[6] These are "Jableh Co. for Conserves", "Jableh Spinning Co", "Natural Silk Co. in Dreikiesh", and "Arab Co. for Producing and Marketing peanuts".

A common way of calculating the response rate as suggested by De Vaus (1996: 107) is by using the formula:

***Response rate = Number returned/N in sample- (Ineligible+ Unreachable)***

Using this formula the response rate in this research was calculated as follows:

Response rate = 36/53 – 7 = **78.26%**

It can be concluded that this research has achieved a high response rate, which is probably common for surveys that rely on the presence of the researchers (Hussey and Hussey, 1997: 163).

It should be noted that the data collection strategy adopted in this research has had some limitations regarding the effort required to distribute the questionnaires and collect them, and the high travelling costs incurred. However, the very high response rate achieved made the efforts exerted worthwhile.

## 5-5 Testing for non-response bias:

Sampling bias is one of the problems of quantitative research. It 'means simply that those selected are not typical or representative of the large populations they have been chosen from.' (Babbie, 2001: 182).

Non-response bias 'occurs if all the questionnaires are not returned' which in turn means 'the data may be biased and thus not representative of the population' (Hussey and Hussey, 1997: 164).

Wallace and Mellor (1988: 132-133) identified three methods of dealing with non-response in questionnaire research including analysing the responses by date of reply, comparing the profile of respondents against known characteristics of a sampled population and comparing the characteristics of respondents with non-respondents from the sample.

The second method was adopted in this thesis, comparing the responding companies and the population in respect of certain known characteristics of the population and the sample. The researcher adopted this method because it was possible to collect demographic data about the responding SPCs and the population from which they were selected.

The logic of this method is that 'if those who have responded truly represent the population (including the non respondents) then their responses can validly provide a basis for generalizations' (Wallace and Mellor, 1988: 133).

Two variables were used to examine non-response bias, namely the number of employees and the groups of industries to which the selected companies belonged as discussed below.

**5-5-1 Comparing the responding companies and the population in terms of type of industries:**

In order to examine whether or not there is a difference between the responding companies and the population in terms of groups of industries to which they belonged, a Chi square test for one sample was conducted.

This test is suitable in this case given the level of measurement of the variable (type of industry), which has been measured using a nominal scale of seven categories. Chi square test for one sample 'compare the observed frequencies of cases with those expected in a variable which has more than two categories' (Bryman and Cramer, 2001: 119). It is, therefore, a test of goodness of fit because it assesses the correspondence between the observed and expected frequencies in each category (Siegel and Jr., 1988: 45).

There is, however, a restriction on using Chi-square test when the expected frequencies are small. With categorical variables of three or more categories (or more than one degree of freedom), Chi-square should not be used when any expected frequency is smaller than one or when more than 20 per cent of expected frequencies is smaller than five (Bryman and Cramer, 2001: 121, Siegel and Jr., 1988: 49). Bryman and Cramer suggest that in such situations 'it may be possible to increase the expected frequencies in a category by combining it with those of another' (2001: 121).

Table (5-6) shows the distributions of the responding SPCs and the SPCs population according to the type of industry, after combining the groups of industries chemical and cement; sugar, tobacco and engineering, together in order to meet the conditions of the Chi square test.

In this procedure the researcher tests the null hypothesis (*H0*) that the observed frequencies of responding SPCs in each group of industries are not different from those in the population of SPCs, and that there is no significant difference between the observed and the expected frequencies. Expected frequencies have to be greater than zero and are stated as proportions (See Bryman and Cramer, 2001: 120). The proportions in this case are: 22.9, 26, 28.2, and 22.9 as shown in table (5-6).

Siegel and Jr. have mentioned that in hypotheses testing,

> *"our procedure is to reject H0 [null hypothesis] in favour of H1 [alternative hypothesis] if a statistical test yields a value whose associated probability of occurrence under H0 is equal to or less than some small probability, usually denoted* $\alpha$ *. That probability is called level of significance" (1988: 8-9).*

The authors have indicated also that the common values of alpha ($\alpha$) are 0.05 and 0.01 (1988: 8-9).

**Table (5-6): The distributions of responding SPCs and the SPCs population after combining the groups of industries with low frequencies together**

| Group of industry | Responding companies | | SPCS Population | |
|---|---|---|---|---|
| | Frequency | Percentage Within sample | Frequency | Percentage within population |
| Chemical and Cement | 8 | 22.2% | 22 | 22.9% |
| Sugar, Tobacco and Engineering | 11 | 30.6% | 25 | 26.0% |
| Textile | 12 | 33.3% | 27 | 28.2% |
| Food | 5 | 13.9% | 22 | 22.9% |
| Total | 36 | 100.0% | 96 | 100.0% |

Thus a significant value of Chi–square, (P = 0.05 or less) under this null hypothesis means that the *H0* hypothesis is rejected. While insignificant value of chi–square (P > 0.05) means the null hypothesis cannot be rejected.

Results of the Chi-square test on the variable (Industries in responding companies combined) are presented in table (5-7).

**Table (5-7) Results of Chi-square test on the variable group of industries combined**

| Group of industries combined | Observed N | Expected N | Residual |
|---|---|---|---|
| Chemical, Cement | 8 | 8.3 | -0.3 |
| Engineering , Tobacco, Sugar | 11 | 9.4 | 1.6 |
| Textile | 12 | 10.1 | 1.9 |
| Food | 5 | 8.3 | -3.3 |
| Total | 36 | Degrees of freedom = 3 | Significance = 0.589 |
| Chi-Square = 1.920 | | | |

0 cells (.0%) have expected frequencies less than 5. The minimum Expected cell frequency is 8.3.

As the results of Chi Square test show, no significant difference (P = 0.589 > 0.05) was found between the observed frequencies and the expected frequencies in each group of industries, which means that the null hypothesis that the observed

frequencies of responding SPCs in each group of industries are not different from those in the population of SPCs cannot be rejected.

It can be concluded that the proportions of responding SPCs in each group of industries are similar to those in the population of SPCs and no bias was detected.

### 5-5-2 Comparing the mean number of employees in responding companies and the population of SPCs:

The second demographical variable for which the researcher could collect data about for both the sample and the population was the number of employees.

Thus it is possible to compare the population and the sample of responding companies in terms of number of employees. The absence of a significant difference between the population and the sample would mean the absence of responding bias and one could be confident that the sample is more likely to be representative of the population from which it has been selected.

Given that the variable (number of employees) is of interval level of measurement the t test for one sample could be used. This procedure is used 'to determine if the mean of a sample is similar to that of the population' (Bryman and Cramer, 2001: 138).

Table (5-8) shows the means of the number of employees in the population and responding companies. It can be seen from the table that the mean number of employees in the sample (1062.39) is greater than the mean number of employees in the population of SPCs (883.34).

In this procedure the null hypothesis (H0) would be that "the mean numbers of employees in the responding companies and the population of SPCs are not

different (similar)", while the alternative hypothesis is that "the mean numbers of employees in the responding companies and SPCs population are different". Rejection of the null hypothesis ($P \leq 0.05$) would indicate that the null hypothesis is wrong and that the two means are dissimilar.

**Table (5-8): The mean numbers of employees in the responding companies and the SPCs population**

| | | Number of employees in the population | Number of employees in the responding companies |
|---|---|---|---|
| N | Valid | 95 | 36 |
| | Missing | 1 | 0 |
| Mean | | 883.34 | 1062.39 |

As a parametric test, however, the t test requires that the variables of interest be normally distributed (Field, 2000: 46; Bryman and Cramer, 2001: 115). Thus, before conducting the test on the two variables, namely the number of employees in the responding sample and the population, they were tested for normality. Kolmogorov-Smirnov (KS) is one of the tests used to detect whether a variable is normally distributed (Field, 2000: 46). A significant value of the test means that the variables are not normally distributed.

Results of applying (KS) are shown in table (5-9).

As can be seen from the table the values of KS test statistic are significant for the two variables, Number of employees in responding SPCs and Number of employees in SPCs population, ( P = 0.02, and 0.0001 respectively) indicating that the distributions of the two variables are significantly different from the normal distribution.

Thus applying t test might not be suitable in this case, as the assumption of normality has been violated. It should be noted, however that the need to meet the assumptions of parametric tests 'has been strongly questioned' (Bryman and Cramer, 2001: 115).

**Table (5-9): Tests of Normality on the variables number of employees in the responding SPCs and SPCs population**

| Variables | Kolmogorov-Smirnov (a) | | |
|---|---|---|---|
| | Statistic | Degrees of freedom | Significance level. (p) |
| Number of employees in the responding SPCs | 0.190 | 36 | 0.002 |
| Number of employees in SPCs population | 0.192 | 95 | 0.000 |

a Lilliefors Significance Correction

In the case of violating the assumptions of parametric tests Bryman and Cramer suggest that 'it may be prudent to compare results of a non-parametric test with those of a parametric test' (2001: 115).

One of the non-parametric tests that could be used to compare two samples if the assumptions of t test were not met is Mann-Whitney test (Siegel and Jr., 1988: 129). This test relies on comparing the mean ranks of scores rather than the mean of the scores themselves (See Bryman and Cramer, 2001: 133-134). Thus if the mean number of employees in responding SPCs and SPCs population are similar then there will be no difference between the mean ranks in the sample and the population (Siegel and Jr., 1988: 130). The null hypothesis (H0) in this case would be that "the number of employees in the population of SPCs and the responding companies are not different (similar)".

Rejection for this hypothesis ($P \leq 0.05$) would mean that the mean ranks of number of employees in the sample and the population are significantly different

and that the responding companies and the SPCs population are different in terms of the number of employees. Results of the two tests are shown in table (5-10).

As can be seen from the table (5-10) the level of significance (p values) for the t test and Mann-Whitney test are insignificant (P = 0.323, and 0.302 respectively). This in turn indicates that the null hypotheses under the two tests cannot be rejected. That is there is no significant difference between the responding companies and the SPCs population in terms of number of employees.

**Table (5-10): Results of applying one sample t test and Mann-Whitney test to compare the mean numbers of employees in the responding SPCs and SPCs population**

| Number of employees | N | Mean | t | Mean Rank | Mann-Whitney U |
|---|---|---|---|---|---|
| Responding SPCs | 36 | 1062.39 | 1.002 | 71.56 | U =1510.000<br>Z = -1.031 |
| SPCs Population | 95 | 883.34 | | 63.89 | |
| Degrees of freedom = 35 | | | Significance (P) (2-tailed)= 0.323 | | Significance (P) (2-tailed)= 0.302 |

Based on the above discussion and the results of statistical tests used in this section, it can be concluded that although the sample in this research is a small sample, no non-response bias was detected in the collected data. This indicates that the selected sample in this thesis seems representative to the population from which it has been selected.

## 5-6 Validity and reliability assessment:

One of the main concerns in the survey research design is the reliability and the validity of the instrument. This section is devoted to assessing the validity and reliability of the instrument used in this thesis.

### 5-6-1 Validity assessments:

As Oppenheim (1992: 144-145) has mentioned validity 'tells us whether the question, item or score measures what it is supposed to measure'.

Similarly Babbie has identified validity as it refers to:

> *"the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration" (2004: 143).*

Clearly an unreliable measure[7] is definitely not valid. If a measure is considered reliable, however, this does not necessary mean that it is valid (Babbie 2001: 143) because it could be measuring something different from what it is supposed to measure. It is argued that while it is easy to identify the concept of validity; its measurement is very difficult (Moser and Kalton, 1972: 355).

The social sciences research literature refers to different types of validity:

**External validity**: this type of validity refers to the generalizability of a research findings. That is 'the extent to which the findings of a particular study can be generalized across populations, contexts and time' (Modell, 2005: 234). Thus it is reliant on the representativeness of the sample to the population from which it has been chosen.

Modell argues:

> *"External validity is enhanced where patterns or hypotheses emerging from the case studies are corroborated by survey-based test across large samples" (Modell, 2005: 235).*

[7] Reliability is dealt with in section 5-6-2.

For this research the hypotheses were derived from both the theory and the interview evidence, which in turn could enhance the external validity of the research.

**Internal validity:** this term refers to the credibility of the causal relationships between independent and dependent variables inferred from the data, it is therefore 'a pre-requisite for validity' (Modell, 2005: 236).

**Face and content validity:** face validity is manifested when a common thread of a construct is reflected in all scale items, which are supposed to measure this construct (Moser and Kalton, 1972: 355). That is at face value the items seem to reflect the concept being measured. As far as content validity is concerned, it goes a further step by assuming that the items included in the measurement should cover the full range of the construct in a balanced way. The assessment of this type of validity is a matter of the judgement of the investigator or other experts (Moser and Kalton, 1972: 356). The researcher and experts in the field, particularly his supervisor, assessed the face and content validity of items included in the measurement of the main constructs in this research.

**Construct validity:** this type of validity refers to whether the constructs or concepts used in a research are adequately reflected by the measures utilized to operationalizing them. Construct validity is reliant on theory and 'the examination of the observed associations' (Moser and Kalton, 1972: 356). Researchers argue that construct validity can be enhanced through 'qualitative elements, such as feedback from practitioners as well as peers familiar with the research issues at hand' (Modell, 2005: 237).

For this research indicators used to measure the different constructs were extracted from the fieldwork interviews they therefore reflect the practitioners perceptions. The final questionnaire was examined by some academic staff particularly the researcher's supervisor and other colleagues who are specialists in the area.

### 5-6-2 Reliability assessments:

Reliability refers to the consistency and the repeatability of a measure (Bryman and Cramer, 2001: 62; Moser and Kalton, 1972: 353; Oppenheim, 1992: 144; Saunders *et al*, 2003: 309,). That is a measure is deemed reliable if it would give us the same results over and over again.

The social research literature has referred to several approaches to estimate research reliability (See Bryman and Cramer, 2001: 62; Moser and Kalton, 1972: 353-355; Saunders, *et al*, 2003: 310,) as discussed below.

**Test retests approach:**

This approach relies on correlating the data gathered from respondents using one instrument with those collected from the same respondents and instrument and under as near equivalent conditions as possible. That is the questionnaire needs to be administered twice on the same respondents (Bryman and Cramer, 2001: 63; Hussey and Hussey, 1997: 173). This method has been criticised. It is argued that:

> *"it is often difficult to persuade respondents to answer questions a second time and, if they do, they may think more deeply about the questions on the second occasion and give different answers" (Hussey and Hussey, 1997: 173).*

Moreover the greater the time span between the two times of data collection, the less likely that the respondents will give the same responses (Moser and Kalton, 1972: 353-354).

**Alternative form approach**:

This method relies on embodying alternative forms for a question or group of questions and comparing the responses. This approach also suffers from some weaknesses as it lengthens the questionnaire, and the alternative questions might not be substantially equivalent to the main questions (Saunders, *et al*, 2003: 310).

**Internal consistency approach:**

This approach estimates reliability by grouping questions in a questionnaire that measure the same concept. Then correlating the responses related to each group of questions in order to assess whether the group of questions is a reliable measure of the concept.

Cronbach's alpha is one of the most frequently used measures of internal consistency (Saunders, *et al*, 2003: 310; Cramer, 1994: 269). It is also a measure of unidimensionality of scales.

The assessment of the internal consistency of the measures used in this research and their validity assessments were discussed in further details in Chapter 7.

## 5-7 Summary of chapter 5:

This chapter discussed the logic of the research methodology, outlined the research hypotheses and how the main variables were operationalized. It also presented the different stages and procedures undertaken to develop the main research instrument and to collect data that used to satisfy the research objectives. Tests were undertaken to detect sampling bias and no bias was found. Validity and reliability of instrument were outlined and examined further in chapter 7. The remaining chapters in the thesis will deal with data analysis and report the research results.

# Chapter (6): The practice of SCS in SPCs, descriptive analysis

## 6-1: Introduction

This chapter presents a descriptive statistical analysis of the survey instrument used to explore the practice of SCS in the SPCs. It aims, therefore, to achieve the first objective of this research, namely to document the extent to which SCS is in use in SPCs and show how it has been implemented. It provides additionally some information about the survey respondents.

The chapter has been structured as follows: The first section presents some demographic statistics about the survey respondents; the second section reports the answers given by the respondents to the questions related to the practice of SCS.

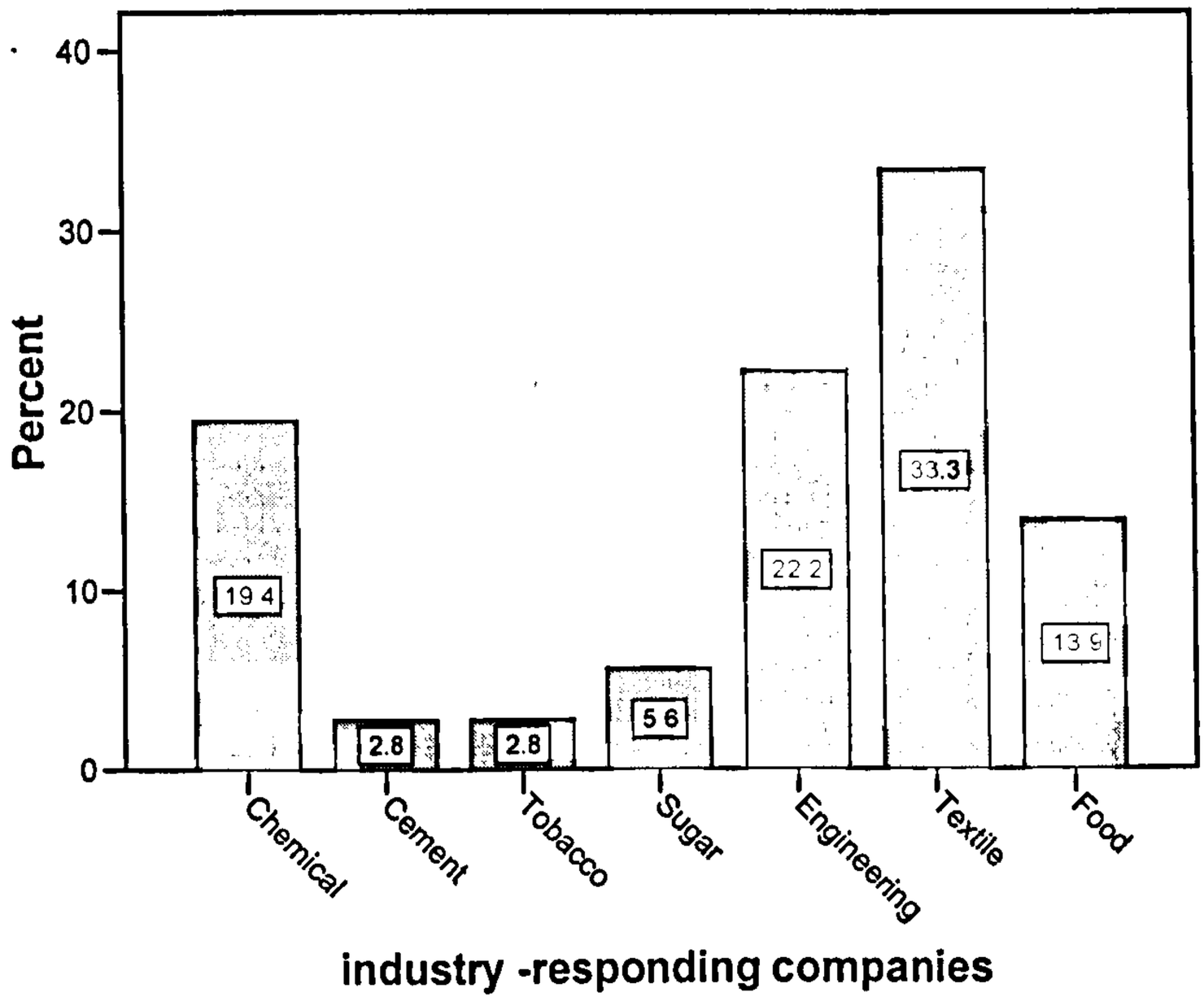
## 6-2: Demographic statistics about the survey respondents

This section provides demographic information about SPCs that took part in this research. The first subsection reports general information about participating companies; the second subsection shows demographic information about the survey respondents.

### 6-2-1 General information about responding SPCs:

As noted in chapter 5, the research covers SPCs, which are clearly manufacturing and work under the supervision of the Ministry of Industry in Syria. Figure (6-1) shows the distribution of the responding SPCs into the different groups of industry.

**Figure 6-1 Industry types in responding SPCs**




As can be seen from the figure the majority of the companies that took part in this research belong to textile (33.3%), engineering (22.2%), chemical (19.4%), and food (13.9%) industries, with the textile and engineering companies being the largest groups. This is, actually, logical because these four groups represent the largest groups in the sampling population (See table 5-5 in chapter 5). Companies belonging to the tobacco, sugar and cement industries represent the smallest groups of respondents in the cluster sample with proportions equal to (2.8%), (5.6%) and (2.8%) respectively.

Companies involved in this research differed in size. The size was measured using the number of employees with the mean number of employees equal to (1062.39). This

variable was recoded into seven groups in order to make the measurement of this variable correspond with the scales used to measure the main constructs in this research. The distribution of SPCs according to their size is presented in table (6-1).

It can be seen from table (6-1) that companies with a number of employees of 250 or less accounted for (33.3%) (considered small). Companies that can be classified as medium size, with a number of employees ranged between 251 to 1500 accounted for (44.5%). Large companies that had a number of employees of 1501 or more accounted for (22.2 %).

**Table (6-1) The distribution of SPCs according to the groups of number of employees**

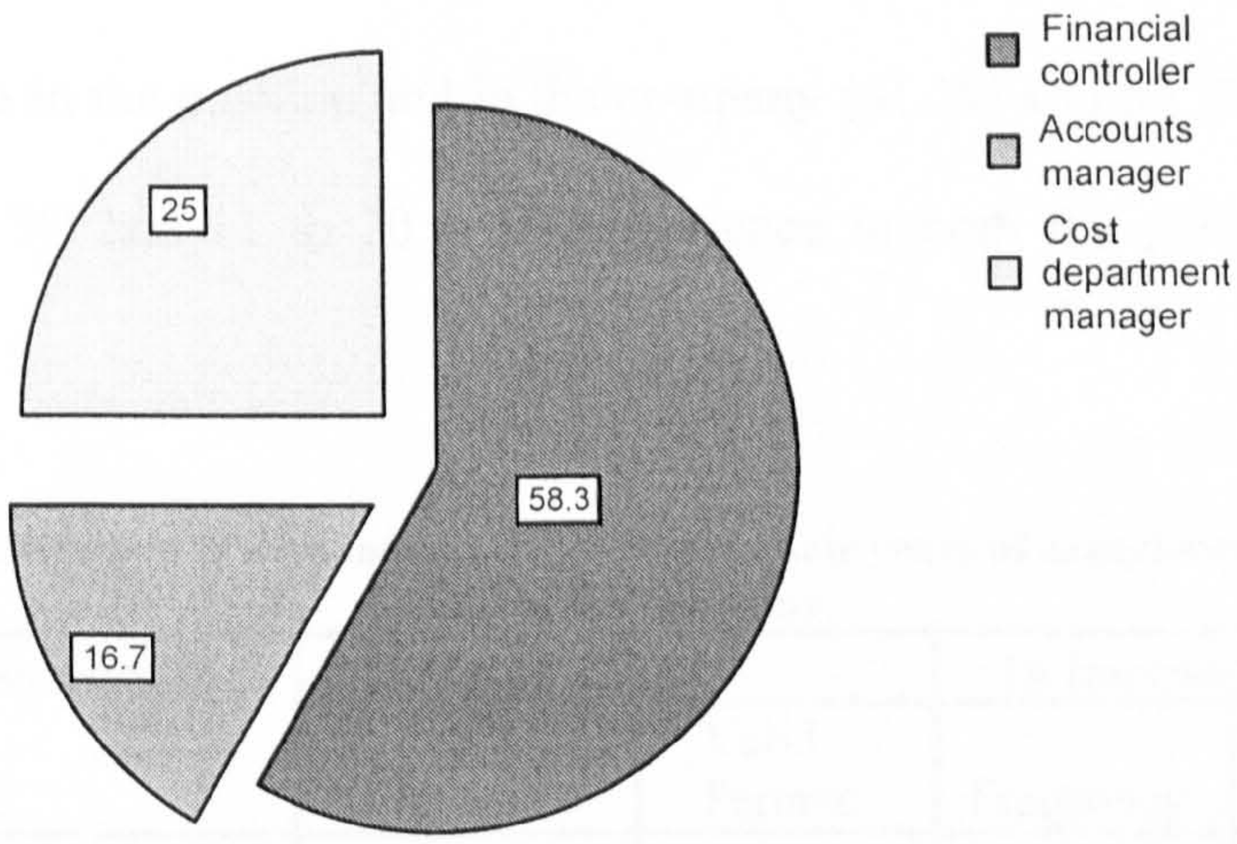
| Groups of number of employees | Frequency | Valid Percent | Cumulative Percent |
|---|---|---|---|
| <100 employees | 2 | 5.6 | 5.6 |
| 100 to 250 | 10 | 27.8 | 33.3 |
| 251 to 500 | 4 | 11.1 | 44.4 |
| 501 to 1000 | 5 | 13.9 | 58.3 |
| 1001 to 1500 | 7 | 19.4 | 77.8 |
| 1501 to 2500 | 3 | 8.3 | 86.1 |
| >2501 | 5 | 13.9 | 100.0 |
| Total | 36 | 100.0 | |

It can be concluded, therefore, that the majority of the companies in this sample are either of small or medium size in Syrian terms.

### 6-2-2 Personal information about the survey respondents:

Respondents to the questionnaires were financial controllers, accounts managers or cost department managers. Figure (6-2) presents the distribution of SPCs' respondents according to their position.

**Figure 6-2: Position of the respondent**




N=36

As can be seen from the figure (6-2), the majority of respondents in this survey were financial controllers (58.3%). In the remaining cases financial controllers directed the researcher to either accounts managers or cost department managers, whom they deemed experienced in the area of interest and might be more able to answer the questions. Those respondents account for (16.7%) and (25%) respectively.

The experience of respondents ranged from 2 years to 34 years with mean years of experience in the position and in the company of (10.68) and (17.38) respectively. Table (6-2) presents the distribution of respondents according to their years of experience in the position and in the company.

Figures in this table shows that (38.3%) of the respondents, who answered this question, had less than 5 years experience in the position, and only (14.7%) had less than 5 years experience in the company. The majority, however, had more than 5 years experience in the position and in the company (61.7% and 85.3% respectively), of which (26.5 %) had 11 to 20 years experience in both the position and in the company.

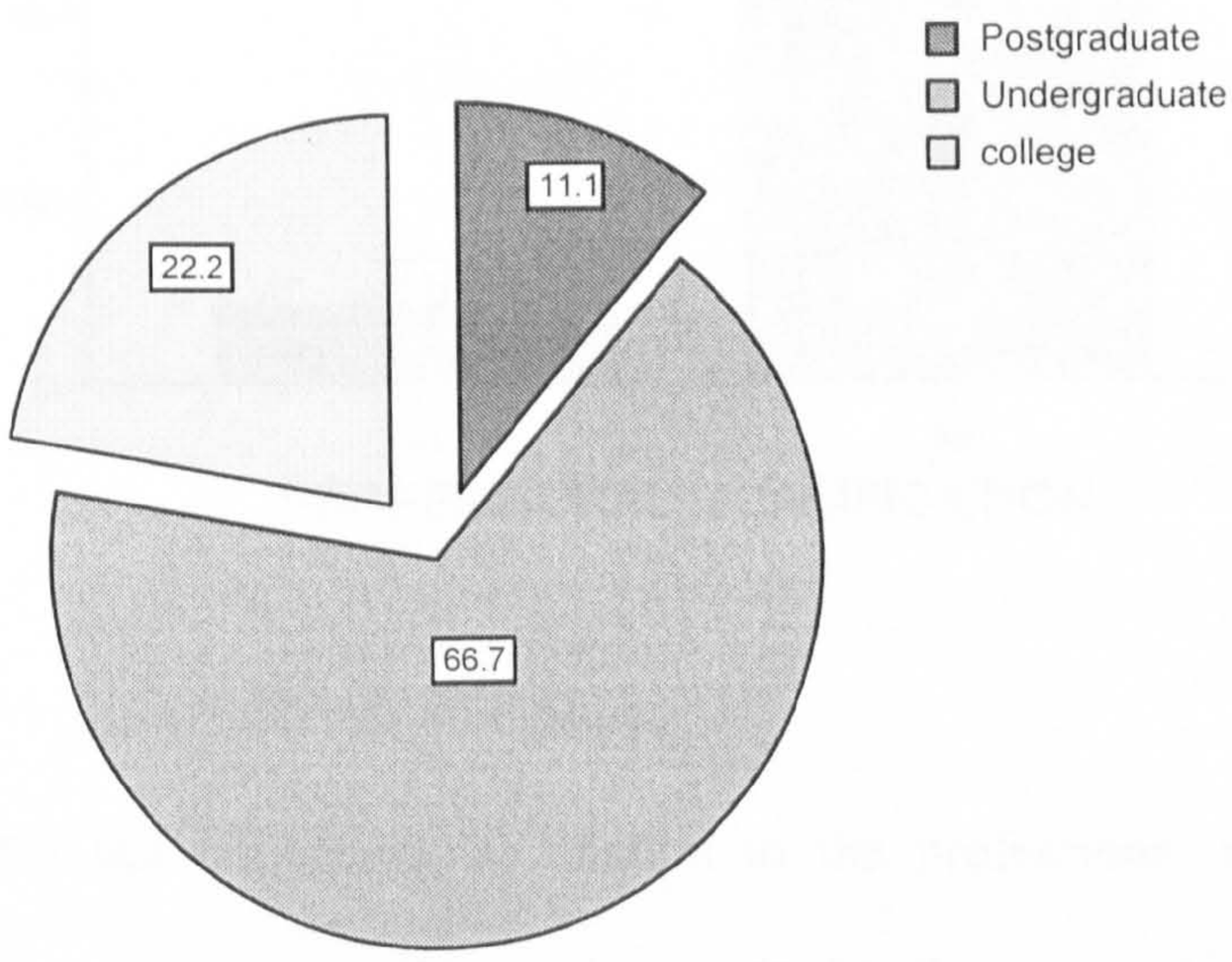
**Table (6-2) Distribution of respondents according to their years of experience in the position and in the company**

| Years of experience of Respondents | | In the position | | In the company | |
|---|---|---|---|---|---|
| | | Frequency | Valid Percent | Frequency | Valid Percent |
| Valid | <5 years | 13 | 38.3 | 5 | 14.7 |
| | 5 to 10 years | 6 | 17.6 | 5 | 14.7 |
| | 11-20 years | 9 | 26.5 | 9 | 26.5 |
| | 21-30 years | 6 | 17.6 | 11 | 32.3 |
| | > 30 years | 0 | 0.0 | 4 | 11.8 |
| | Total | 34 | 100.0 | 34 | 100.0 |
| Missing | System | 2 | | 2 | |
| Total | | 36 | | 36 | |

Moreover, (32.3 %) of the respondents had 21 to 30 years experience in their companies.

Pertaining to the academic qualifications of the respondents, figure (6-3) shows that the majority of participants, who took part in this research, had undergraduate certificate (66.7%), while only (11.1%) had postgraduate and (22.2%) reported that they have a certificate from a specialised college.

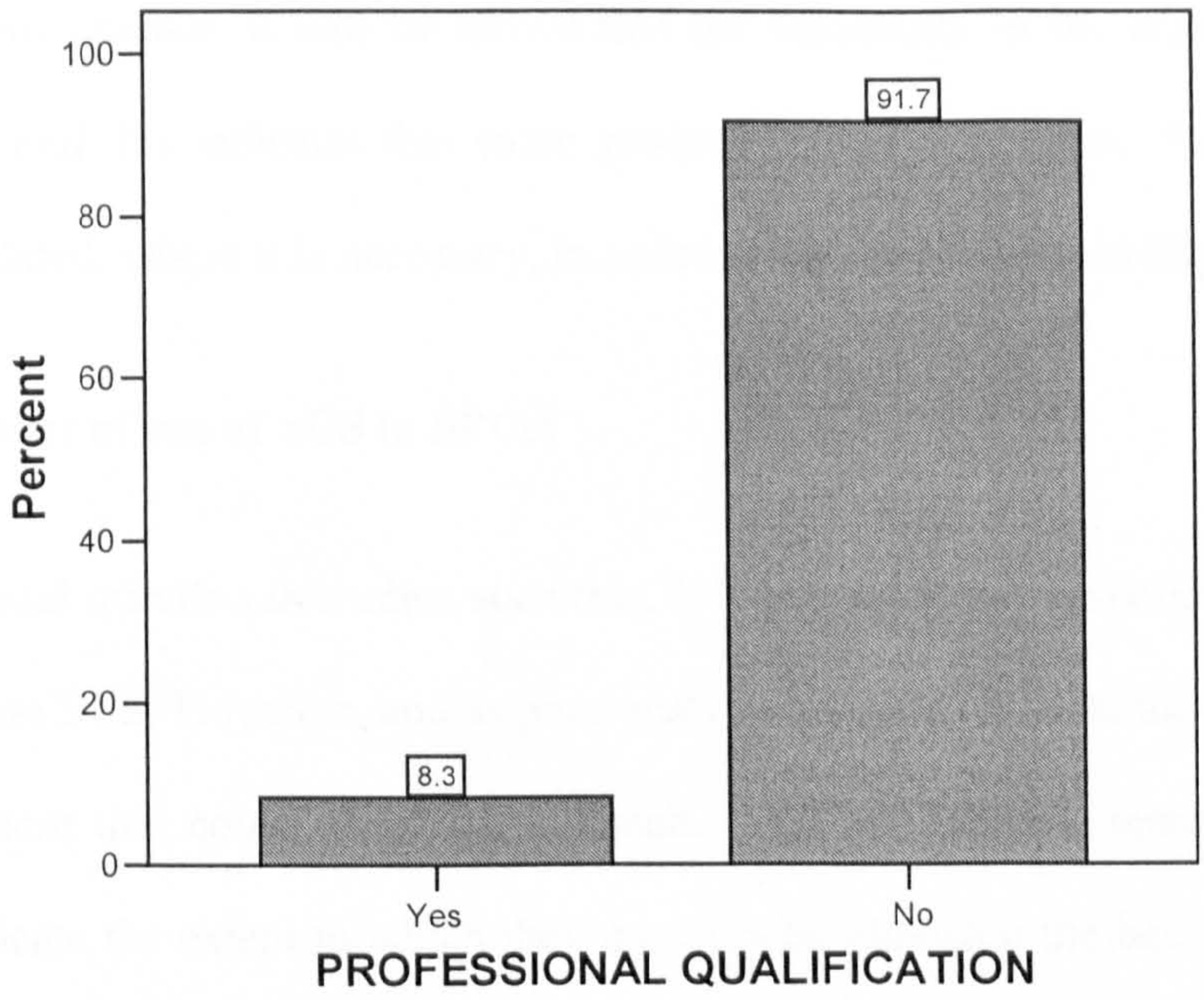
**Figure 6-3 Academic qualification of respondents**




N=36

As far as the professional qualification of participants is concerned, figure (6-4) shows that only (8.3%), of the respondents reported that they had professional certification, while all the other respondents indicated that they did not have a professional qualification (91.7%), which implies in turn a very low diffusion of the professional knowledge in the SPCs.

**Figure 6-4 professional qualification of respondents**




N= 36

Regardless of the last comments, in relation to the professional knowledge, the demographical figures shown in this section, undoubtedly, reveal the competence of the respondents and the long experience they have in their companies. This is surely one of the important concerns in the survey research (Burton, 2000: 321).

## 6-3: The practice of SCS in Syrian public companies

The following subsections will explore the practice of SCS in SPCs. As noted earlier, the questions in the third part of the survey instrument (See appendix B) were adapted from Drury *et al's* (1993) study of MA practices in the UK manufacturing companies. Changes, however, in the wording of the questions were made, where it seemed

necessary in order to make them suit the context of SPCs. Several questions have been added as a consequence of the literature search and fieldwork visits as described in the previous chapter. It will be shown that the variability in the answers was, in general, low and this indicates that some generalizability is possible. Standard error will be calculated, where it is necessary, in order to support this possibility.

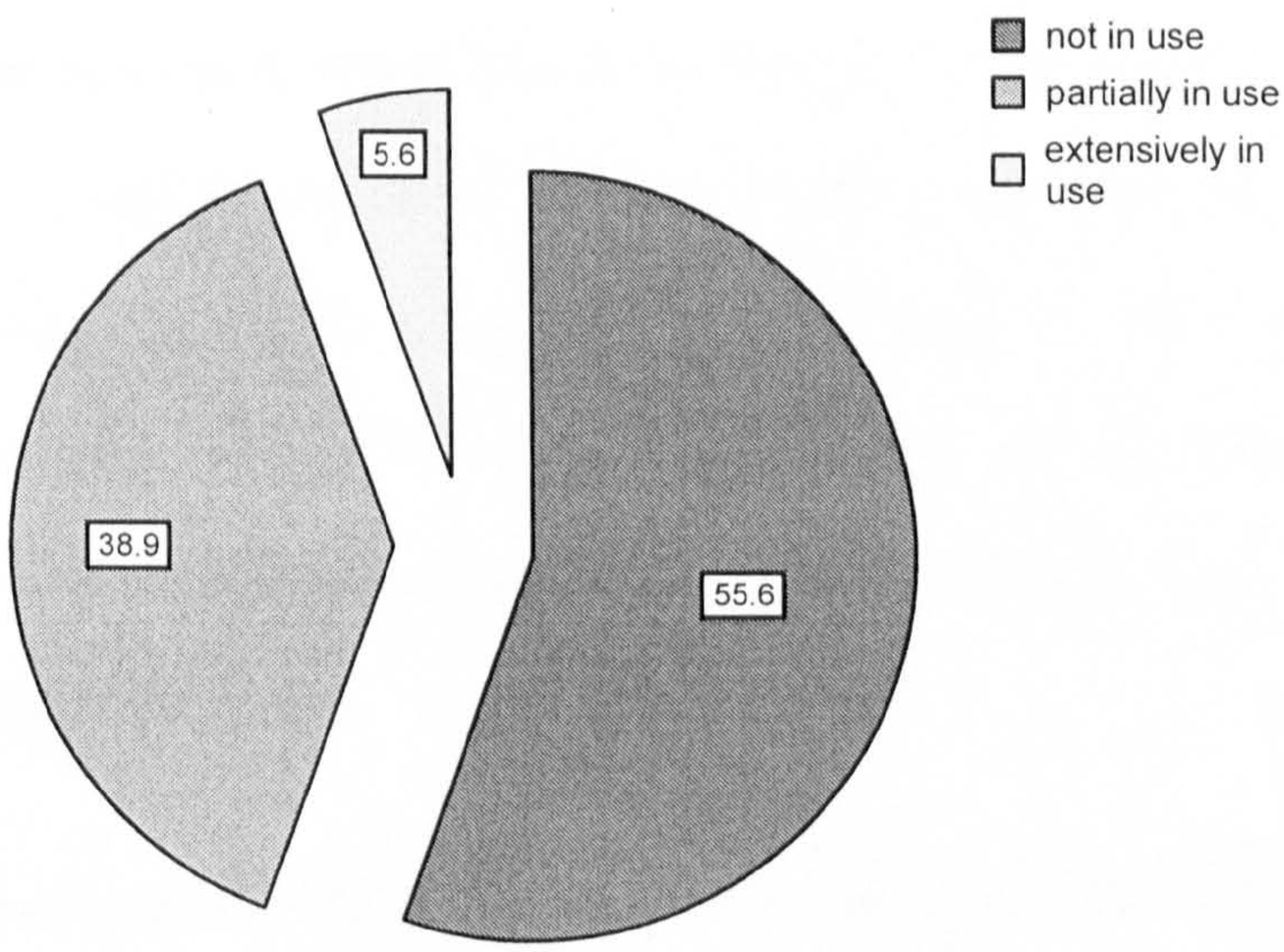
### 6-3-1 the extent of use of SCS in SPCs:

As a traditional question in studies such this, it is normal to ask respondents whether or not they use SCS. However, and as previously mentioned, to meet the ordinal level of measurement that could allow the intended statistical analysis, respondents were asked to indicate the extent to which they use SCS by choosing the best answer from three groups ranging from 1 "not in use", 2 "partially in use" and 3 "extensively in use". Figure (6-5) summarizes the answers to this question.

As the figure shows the majority of SPCs (55.6%, SE[8]= 6.4%) in this sample have reported that SCS is not in use. Interestingly, only two companies (5.6%, SE= 2.9%) reported extensive use of SCS, while (38.9%, SE= 6.3%) answered that they use SCS partially. This finding might indicate that the claims of some Syrian authors (Fakher, 1993: 112) that most of the SPCs don't use SCS are probably exaggerated.

[8] Standard error SE was calculated using the formula, S.E. =√ [(1-n/N) * p (1-p)/n], suggested by Moser and Kalton (1972:147), where N= 92 is the population size after excluding the non active companies, n= 36 number of responding companies (See also Lewis and Traill, 1999: 243).

**Figure 6-5 the extent of use of SCS**




N=36

It should be noted, however, that although these results give strong evidence that a considerable proportion of SPCs do use SCS in some form (44.4%), and that they have exhibited some conformity to the regulations (UAS, 1978) that required the use of SCS, the figures plainly do confirm that there are a majority of companies (55.6%), which exhibited resistance to the adoption of SCS.

The extent of use of SCS in SPCs, as documented in this research, seems different from the findings of research in some developed and developing countries, which reported widespread use of this technique. As noted earlier, in the UK, a developed country, Drury *et al* (1993: 35) reported 76% extent of use in the UK firms. In another

study Dugdale, Jones and Green (2006: 85) documented (70%) extent of use in their survey on a small sample of UK companies.

Similarly in less developed countries such as Malaysia, Sulaiman *et al* (2005: 114), reported (70%) extent of use of SCS in local Malaysian companies and (76%) in Japanese affiliates. It can be concluded that compared to some developed and developing countries, SCS in the SPCs seems to have less diffusion despite the coercive pressures of government regulations, which seemingly, have mandated its use in those companies.

**6-3-2 Methods of establishing labour and material standards in SPCS:**

MA literature suggests two main approaches to establish labour and material standards, namely usage of historical records and engineering studies (Drury *et al* 1993: 35; Drury, 2000: 675).

In the first approach the average of past performance for similar operations is used. This average is then adjusted, based on arbitrary judgements, in order to eliminate any excess usage of cost elements and to make the standards more challenging.

In contrast, in the engineering studies approach, cost standards can be set by carefully specifying materials, labour and equipments required to perform each operation. It can additionally incorporate the usage of 'controlled observations of operations involving the use of trial runs and work study' (Drury *et al* 1993: 35).

In question (13) respondents were asked to indicate the extent to which their companies use the four methods of establishing cost standards.

Responses to this question are presented in table (6-3)

**Table (6-3): Methods used to establish labour and material standards in SPCs**

| | Average of Historical usage | | Work study | | Engineering studies | | Observations based On trial runs | |
|---|---|---|---|---|---|---|---|---|
| | Valid % | SE[9] | Valid % | SE | Valid % | SE | Valid % | SE |
| Never, rarely, or sometimes | 31.2 | 8.9% | 75.0 | 8.3% | 43.8 | 9% | 87.5 | 6% |
| Often or always | 68.8 | 8.9% | 25.0 | 8.3% | 56.2 | 9% | 12.5 | 6% |
| Total | 100.0 | | 100.0 | | 100.0 | | 100.0 | |

N= 16

It can be seen from the table that the majority (68.8%) of SPCs that reported use of SCS do use the average of historical usage method often or always (sum of percentages of groups of responses "4" and "5"); (56.2%) of the companies also reported also often or always usage of engineering studies method; while only (25%) and (12.5%) of the respondents have reported often or always use of work study and trial runs methods respectively. One can conclude that the average of historical cost and the engineering studies seem to be the most widely used methods in establishing cost standards in the SPCs, with some preference for the historical usage method.

[9] The calculation of SE in the remainder of this chapter based on an estimation of the number of users in the SPCs population of N= 40 (92 x 44%), n= 16, and using the same formula mentioned earlier in this chapter.

This finding is actually consistent with some research in other developed and developing countries. Sulaiman *et al* reported roughly similar percentages. They found that (63%) of Malaysian local companies used average of historical usage whereas (46%) of those companies declared usage of engineering studies method (Sulaiman *et al*, 2005: 115). While findings in other developed countries, such as UK, seem similar in terms of the preference for using the two mentioned methods, a greater percentage of the UK companies (51% often/ always) seem to use the engineering studies method compared to the average of historical usage (44%) (Drury *et al*, 1993: 35).

Thus, the above comparison might indicate that some less developed countries tend to rely on less scientific methods in establishing their standards (average of historical cost), compared to some other developed countries.

The preference for using average of historical costs accords with the conventional beliefs of some authors, who noted that, despite the disadvantages of the average of historical usage method, regarding the incorporation of past inefficiencies in the established standards, 'standards derived from average historical usage do appear to be widely used in practice' (Drury, 2000: 675). One reason for the wide use of this type of standards is, probably, that 'Past data are typically available at a relatively low cost' (Horngren, Foster, and Datar, 2000: 225).

**6-3-3: Cost standards established and types of standards used in SPCS:** MA textbooks describe six main types of cost standards covering the different manufacturing cost elements, and used in calculating cost variances (Drury, 1996:546; Wood and Sangster, 2005: 617). Those standards include:

- Direct material quantity standards (DMQS): those standards define the optimal quantity, including the allowable spoilage, which should be consumed from each type of materials. They are usually established based on product specifications, and after conducting intensive studies for the input quantity required for each operation, and after taking into account product design and quality policy (Drury, 1996: 546; Dopuch *et al*, 1982: 208-210).
- Direct material price standards (DMP): those standards define the allowed price per unit for each type of materials. They are established by purchasing departments after taking into consideration the selection of suitable suppliers, who could provide the required materials in accordance with quality specifications at the minimum price.
- Direct labour efficiency (time) standards (DLES): those standards represent the 'number of standard hours required by an average worker to complete the job' (Drury, 1996: 547) under the most efficient production conditions, and after taking into consideration the inevitable breakdowns in the machines and the time required for workers to have a break (Faker, 1993: 216).
- Wage rate standards (WRS): the determination of those standards might be complex depending on the level of diversity of labour force used (Dopuch *et al*,

1982: 213). They are also usually affected by company policy and labour regulations and defined based on negotiation between management and unions.

- Variable overhead rate standards (VORS): Variable overheads are those indirect costs, which vary depending on the changes in a selected measure of the level of output. Variable overhead includes, therefore, several items and 'Various statistical tests can be applied to ascertain the relationship between activity measures and variable overhead expenses' (Drury, 1996: 547), in order to derive the standard rates of variable overhead.
- Fixed overhead rate standards (FORS): Fixed overheads are those expenses, which show no relationship with the level of activity. The (FORS) are established for each production department by estimating the fixed departmental overheads for a period, which is then divided by the budgeted level of activity to obtain the fixed overhead rate per unit of activity (Drury, 1996: 547).

The available studies have not explicitly reported the cost standards established by the surveyed companies (see for example Puxty and Lyall, 1990, Drury *et al* 1993; Cress and Pettijohn, 1995; Sulaiman *et al*, 2005). Thus the researcher decided to add this question to the survey. Table (6-4) summarizes the answers provided by the SPCs' respondents to the question related to the standards they established.

As table (6-4) shows, all the user companies in this sample did establish direct material quantity standards, but only (31.2 %) established direct material price standards. Similarly, although only (43.8%) of the SPCs have reported the usage of direct labour efficiency standards, it is just (6.2 %) of the companies have established

wage rate standards. Moreover, none of the SPCs have established variable or fixed overhead standard rates. It seems that more emphasis has been placed by the SPCs on the quantity or efficiency standards rather than on material price or wage rate standards. They appear to focus more on using standards to control materials, and to a lesser extent labour, but not to control overheads.

**Table (6-4) cost standards established by SPCs**

| | Yes<br>Valid % | No<br>Valid % | Total | SE |
|---|---|---|---|---|
| Direct material quantity standards (DMQS) | **100.0** | 0.0 | 100.0 | 0.0 |
| Direct material prices standards (DMPS) | 31.2 | 68.8 | 100.0 | 8.9% |
| Direct labour efficiency standards (DLES) | **43.8** | 56.2 | 100.0 | 9% |
| Wage rate standards (WRS) | 6.2 | 93.8 | 100.0 | 4% |
| Variable overhead rate standards (VORS) | 0.0 | 100.0 | 100.0 | 0.0 |
| Fixed overhead rate standards (FORS) | 0.0 | 100.0 | 100.0 | 0.0 |

N=16

These findings, to some extent, seem consistent with other research, which suggests that practitioners are more interested in direct material standards compared with other cost elements, and that they show less emphasis on overhead standards. For example Dugdale *et al* (2006: 89) found that in 30 British companies, which reported the use of SCS, they did establish material standards. However, the authors were surprised that much less emphasis has been placed on establishing overhead standards. Similarly, Horngren and Sundem have thought that:

*"In practice, direct materials and direct labor are often said to be controlled with the help of standard costs, whereas all other costs are said to be controlled with the help of departmental overhead budgets" (1990: 215).*

The establishment of cost standards raises a question concerning how demanding the standards should be. MA textbooks classify standards into three main categories, basic, ideal, and current attainable standards (Drury, 2000: 678; 1996: 548).

Basic standards are 'left unchanged over long periods'; while ideal standards represent 'the minimum costs that are possible under the most efficient operation conditions' and stand for maximum efficiency standards; and current attainable standards are those cost standards 'that should be incurred under efficient operating conditions' and allow, therefore, some inevitable waste (Drury, 2000: 678).

It has been argued that, for standards to be effective, they should be reasonably achievable (Dopuch *et al*, 1982: 185; Drury, 1993: 36; Solomons, 1968[b]: 427; Wood & Sangster, 2005: 617) and reflect the current production conditions (Fakher, 1993: 97). Unachievable or ideal standards 'are not widely used, however, because they have an adverse effect on employee motivation' (Horngren & Sundem, 1990: 216).

Accordingly, the respondents in the SPCs were asked to indicate whether the types of standards they use are ideal, basic, or current attainable standards. Answers related to this question were listed in table (6-5).

Figures in table (6-5) show that, (37.5%) of respondents did mention that they use basic standards, while the majority (62.5%) reported the usage of attainable current standards, none of them, however, used ideal (maximum efficiency) standards.

**Table (6-5) Types of standards used in SPCs**

| | Yes<br>% | No<br>% | Total<br>% | SE |
|---|---|---|---|---|
| Ideal standards | 0.0 | 100.0 | 100 | 0.0 |
| Basic standards | **37.5** | 62.5 | 100 | 9% |
| Attainable current standards | **62.5** | 37.5 | 100 | 9% |

N=16

What is surprising in these figures is that a considerable proportion of companies have reported usage of basic standards. Although these types of standards have the advantage of being constant for a long period of time, so that trends of efficiency and comparison with actual costs can be made over several years, they might lose their usefulness if changes in methods of production or price levels occurred. Thus authors have argued that 'basic cost standards are seldom used' (Drury, 2000: 678).

The findings in SPCs context, therefore, contrast some authors' beliefs (Drury, 2000). Given the emphasis shown by the SPCs on establishing quantity standards rather than price standards, as noted above, and given that changes in production methods are less likely to occur frequently within a short-term period, it makes sense that some companies have reported the use of basic standards. Quantity standards are typically more stable than price standards. It might be also that managements in some SPCs have shown little interest in continuous improvement to cope with the changing environment, or it might be that the operation conditions, in which some of those companies operate, are stable.

Talking about the types of standards used raises another question concerning how frequently the standards are revised. The respondents in SPCs were required to select

from 6 categories, how frequently they revised their standards. Table (6-6) lists the answers given to this question.

The majority of SPC users in this sample revised their standards whenever the variances indicated a change in the standards (50%); only (18.8%) revised the established standards annually; interestingly and consistent with the fact that some companies have reported the usage of basic standards (see table 6-5), (31.2%) of the SPC users mentioned that their standards remain the same for a long period of time.

**Table (6-6) frequency of revising standards in SPCs**

| | Yes<br>Valid % | No<br>Valid % | Total | SE |
|---|---|---|---|---|
| MONTHLY OR QUARTERLY | 0.0 | 100.0 | 100.0 | 0 |
| SEMIANNUALLY | 0.0 | 100.0 | 100.0 | 0 |
| ANNUALLY | **18.8** | 81.2 | 100.0 | 7.5% |
| CONTINUOUSLY | 0.0 | 100.0 | 100.0 | 0 |
| WHENEVER THE STANDARD CHANGE | **50.0** | 50.0 | 100.0 | 9.6% |
| Others: REMAIN THE SAME FOR A LONG PERIOD | **31.2** | 68.8 | 100.0 | 9% |

N=16

This finding seems different from the UK 1993 survey by Drury *et al*, where the majority of respondents in that study (68%) (See Drury *et al*, 1993: 39) pointed out that they revised the established standards annually.

It seems that the majority of SPCs rely on the fact of whether the standards need to change as a criterion for considering the adjustment of these standards, while a considerable percentage of these companies left their standards constant for a long period of time.

Again this might imply that some SPCs are operating in more stable production conditions, and probably, less competitive environments, compared with other developed countries. It might be also that managements in some SPCs have placed little emphasis on adapting manufacturing technology to cope with the changes in the environmental conditions under which those companies operate.

### 6-3-4 Variances reported in SPCs and how variances are treated:

Textbooks have shown remarkable attention to variance analysis, which has been, for decades, considered as an operational control device that points out the operations that are deviating from the established standards, hence drawing the attention of managers to areas where corrective actions are needed (Drury *et al*, 1993: 36, Hirsch, 2000: 350).

MA research, however, suggests that some change has occurred in relation to the importance attached by practitioners to the calculation and the reporting of cost variances, indicating some divergence between ideologies and practice (Dugdale *et al*, 2006: 98; Drury *et al*, 1993: 36-37).

To explore the type of variances used in SPCs, respondents were asked to indicate in five groups of responses ranging from 1 "never" to 5 "always" the extent to which the listed variances are frequently calculated and reported in their companies. Percentages of responses to this question, after combining the groups of responses 4 "often" and 5 "always" together to form a separate group, and the other remaining responses 1 "never" 2 "rarely" 3 "sometimes" to form another group, are presented in table (6-7).

As can be observed from table (6-7) all the SPCs, which reported use of SCS did often or always calculate and report direct material usage variance (100%), and (87.5%) reported often or always total direct material variance. However, only (25%) indicated that they often or always calculate labour efficiency variance.

**Table (6-7): How often the listed variances are calculated and reported in the SPCs**

| Variances reported in SPCs | Never, rarely, and sometimes % | Always and often % | SE | Total |
|---|---|---|---|---|
| Total direct material variance | 12.5 | **87.5** | 6.4% | 100 |
| Direct material quantity variance | 0.0 | **100** | 0.0 | 100 |
| Direct material prices variance | 93.8 | **6.2** | 4.7% | 100 |
| Direct material mix variance | 93.8 | **6.2** | 4.7% | 100 |
| Direct material yield variance | 93.8 | **6.2** | 4.7% | 100 |
| Total direct labour variance | 93.8 | **6.2** | 4.7% | 100 |
| Direct labour efficiency variance | 75.0 | **25.0** | 8.3% | 100 |
| Wage rate variance | 93.8 | **6.2** | 4.7% | 100 |
| Variable overhead efficiency variance | 100 | 0.0 | 0.0 | 100 |
| Variable overhead expenditure variance | 100 | 0.0 | 0.0 | 100 |
| Fixed overhead expenditure variance | 100 | 0.0 | 0.0 | 100 |
| Fixed overhead efficiency variance | 100 | 0.0 | 0.0 | 100 |
| Fixed overhead volume variance | 100 | 0.0 | 0.0 | 100 |
| Fixed overhead volume efficiency variance | 100 | 0.0 | 0.0 | 100 |
| Fixed overhead volume capacity variance | 100 | 0.0 | 0.0 | 100 |
| Sales margin volume variance | 93.8 | **6.2** | 4.7% | 100 |
| Sales price variance | 93.8 | **6.2** | 4.7% | 100 |

N=16

Very small percentages of respondents (6.2%) indicated calculation of direct material price; direct material mix; direct material yield; total labour; wage rate; sales margin volume; and sales price variances. None of the companies, report any of the fixed or

variable overhead variances. Of course, the types of variances reported by the SPCs mirror the type of standards they have established.

Obviously figures reflect that more emphasis has been placed by the SPCs on using standards and calculating variances for direct materials rather than labour or other indirect manufacturing costs, and on controlling quantities and monitoring the efficiency of using material, and to a lesser extent labour hours, rather than controlling material price or wage rate variances. This finding might indicate a divergence between ideology and practice similar to that found in developed countries. While Syrian MA text books include very detailed discussions about variance analysis (Helwa Hanan, 1987; Fakher,1993), practitioners in the public sector tend to show more emphasis on using some of those variance rather than others. It might also support the claim that usage variances are more controllable than price variances (Bromwich, 1980: 200-202).

Another issue that seemed for the researcher as deserving investigation is how variances are treated in the SPCs. Fakher (1993: 341-342) has differentiated between two main approaches for operating SCS, which in turn would affect how variances will be treated, namely statistical and accounting approaches. According to Fakher:

*"The statistical approach of operating SCS, which is widely used in Russia and several other eastern European countries, is considered a control device by which actual cost is measured through recording the actual costs incurred in the accounting books, and reporting the actual costs in the accounting reports and statements analysed into, standard costs, standard variances, and variances of adjusting standards, as the following formula shows:*

*Actual cost of a product = standard costs (+ or -) standard variances (+ or -) variances of adjusting standards" (1993: 342-343).*

Thus, according to the supporters of this approach, controlling cost elements can be achieved through the usage of statistical documents and reports that compare the actual costs with standard costs, without the need of 'complicating the accounting procedures by recording the costs in the accounting books at standard costs'(Fakher, 1993: 342). As Drury mentioned 'Standard costs can be used for planning, control, motivation and decision making purposes without being entered into the books' (2000: 738).

It should be noted that the term statistical approach is used here to refer to that method of operating SCS outside of the books, but not to refer to the statistical approach used in the literature to determine when to investigate variances (See Dopuch, Birnberg, Demski, 1967; Luh, 1968; Drury, 1996:605).

The second approach of operating SCS is the accounting approach, which requires that cost elements be recorded in the accounting books at standard costs. In this approach two main treatments are defined for the disposal of the variances; the first one entails that the variances be charged as expenses to the profit and loss account, hence the inventory is evaluated at standard cost; the second requires the allocation of the variances between inventories and cost of goods sold, hence using variances to revalue inventories (See Drury, 2000: 745).

In line with the above discussion, the SPCs respondents were asked to indicate whether they treat variances, by showing them in profit and loss accounts, by using them to adjust inventory, or reporting them statistically outside the accounting books. Answers to this question are shown in table (6-8).

As the table shows all the SPC users in this sample report the variances statistically rather than recording them in the accounting books. This indicates complete reliance of those companies on the statistical approach in operating SCS. Clearly this approach is different from the prevailing style of operating SCS that has been described in many western MA textbooks.

**Table (6-8) How variances are treated in SPCs**

| | Yes Valid % | No Valid % | SE | Total |
|---|---|---|---|---|
| WRITTEN IN P&L | 0 | 100 | 0 | 100 |
| EVALUATING STOCK | 0 | 100 | 0 | 100 |
| REPORTED STATISTICALLY | 100 | 0 | 0 | 100 |
| OTHERS | 0 | 100 | 0 | 100 |

N=16

It should be noted that the historical evidence available in the SCS literature suggests that this rudimentary approach of operating SCS might proceed in its historical roots the accounting approach. Benninger, for example, thought,

> "Standard cost accounting began as a specialized branch of accounting, in a large degree divorced from the main roots, the general accounts. Gradually, over the years, accountants have endeavoured to utilize the benefits of standard costing within the traditional debit-credit system." (1950: 378).

It is quite surprising however that this approach is still the dominant approach in the SPCs context. It might be that the adoption of this approach of operating SCS by SPCs has been influenced by the eastern European style, particularly by Russia. The claim of some Syrian authors that this approach has been widely used by those countries (Fakher, 1993: 342-343), and the close relationship between Russia and Syria, and the socialist style that was adopted in Syria in the 1970s and 80s, might support this explanation.

### 6-3-5 Purposes for which SCS is used in SPCs:

SCS can serve different organizational purposes as MA suggests. Such purposes include, achieving cost control and performance evaluation, computing product costs, and helping planning and decision making within organizations (Drury, *et al*, 1993: 35; Drury, 2000: 738; Fakher 1993: 25; Solomons, 1968[b]: 426; Sulaiman *et al*, 2005: 114; Zannetos, 1964: 296).

In addition to these benefits, standard costing could provide further advantages if standard costs were recorded in the accounting books (Dopuch *et al*, 1982: 216; Drury, 2000: 738). According to Drury:

> *"the incorporation of standard costs into the cost accounting system greatly simplifies the task of tracing costs for inventory valuation and saves a considerable amount of data processing time" (2000: 738).*

In question 20 the respondents in SPCs were asked to indicate on five points Likert scale ranging from 1 "of no importance" to 5 "vitally important", how important is SCS in serving the listed purposes in their companies.

To allow comparison of responses to this question with previous studies in other countries, the percentages of answers to the groups 4, "above average important", and 5 "vitally important", were combined and presented in table (6-9), along with the answers to this question for the same categories as reported by Drury *et al*'s (1993: 35) survey in the .UK, and Sulaiman *et al*'s (2005: 115) study in Malaysia. As the table (6-9) shows, high proportions of SPCs that use SCS do consider it as above average to vitally important for cost control (81.3%); for computing product costs for decision-making (62.5%); and as an aid for budgeting (93.8%). Clearly none

of the SPCs have considered SCS as important for valuing stock and only (6.2%) attached above average to vital importance to SCS in serving data processing economy, which is obviously understandable given the statistical approach adopted by SPCs in operating SCS.

**Table (6-9): The importance of SCS in serving different purposes in SPCs compared to UK survey by Drury *et al* 1993, and Malaysia survey by Sulaiman *et al* (2005)**

| Purposes for using SCS | Above average and vitally important responses UK % | Above average and vitally important responses Malaysia-local % | Above average and vitally important responses SPCs % | SE |
|---|---|---|---|---|
| Cost control and performance evaluation | 72 | 82 | **81.3** | 7.5% |
| Costing inventory | **80** | **68** | 0.0 | 0.0 |
| Computing product cost for decision making | 62 | 78 | **62.5** | 9.3% |
| As an aid for budgeting | **69** | **67** | **93.8** | 4.6% |
| Data processing economy | 43 | 56 | 6.2 | 4.6% |

N=16

In terms of comparison with the other two studies in the UK and Malaysia, while companies in the three countries seem to attach relatively similar high importance to using SCS for cost control and computing product costs for decision making, both Malaysian and UK companies seem different from the SPCs concerning the importance they attached to using SCS for valuing inventory and as a tool for facilitating data processing.

This again reflects the different approach adopted to operate SCS in the SPCs compared to both Malaysia and the UK. While SPCs seem to use the statistical approach, companies in the other two countries tend to use the accounting approach.

Another difference worthy of mention is that, the SPCs appear to place more emphasis on using SCS as an aid for budgeting (93.8%) compared with both UK (69%) and Malaysian (67%) companies, indicating, probably, heavy reliance of the SPCs on using budgetary system for cost control.

It can be concluded that although the practice of SCS in the SPCs seems partial, a significant proportion of these companies have considered SCS as above average to vitally important for the general purposes of using SCS, namely for cost control, decision making and planning purposes, with some preference for the use of SCS as an aid for budgeting.

### 6-3-6 Factors influencing the types of standards used and variances reported by the SPCs:

The early impression formed by the researcher from the field visits, regarding the partial use of SCS, led him to ask respondents about their opinions about some factors that might influence how SCS has been used in their companies. Possible reasons suggested in this question were extracted from the notes taken during the fieldwork visits and from the historical analysis of the development of SCS in SPCs. The researcher aimed to explore whether the types of standards used were influenced by some internal factors such as management needs, level of experience, controllability of the cost elements, and the use of other techniques such as budgeting; or by some

external institutional factors such as supervisory authority needs, accounting regulations, and the conflicting regulations[10].

Thus, using seven point Likert scales ranging from 1 "strongly disagree" through 7 "strongly agree", respondents were asked to indicate their agreement with seven statements that describe the potential effect of seven factors on the types of standards used and variances reported in the SPCs.

Answers to this question after combining the first three groups (1 "strongly disagree", 2 "disagree", 3 "slightly disagree") and the last three groups (5 "slightly agree", 6 "agree", and 7 "strongly agree") are presented in table (6-10).

It can be seen from the table (6-10) that the SPC users of SCS have shown different levels of agreement with the statements. While they tend to disagree that the types of standards used and variances reported have been influenced by management needs (66.7%), supervisory authority requirements (66.7%), and accounting regulations (53.3%); they tend to agree that the level of variances reported and standards used has been influenced by the remaining factors. They particularly seem to agree that the level of use of SCS and variance analysis is affected by the existence of conflicting regulations and government mandates such as employment law and the government employment policy (86.7%), which was based on the absorption of the labour force and created an over-manning problem in the majority of SPCs (Al-Zaim, 2004: 19; Al-Sayed, 2001: Abstract).

[10] For example the supervisory authority may insist on labour efficiency, (as the UAS requires), while preventing any reduction in the labour force, by asking companies to adhere to the workforce absorption policy.

**Table (6-10) Factors influencing types of standards used and variances calculated in SPCs**

| | Disagree, slightly Or Strongly Disagree | Neither agree nor disagree | Slightly, Agree, Or strongly agree | Total |
|---|---|---|---|---|
| MANAGEMENT NEEDS | 66.7 | 13.3 | 20.0 | 100 |
| SUPERVISORY AUTHORITY REQUIREMENTS | 66.7 | 0.0 | 33.3 | 100 |
| USAGE OF OTHER TECHNIQUES SUCH AS BUDGETING | 13.3 | 20.0 | **66.7** | 100 |
| CONTROLLABILITY OF THE COST ELEMENT | 28.6 | 7.1 | **64.3** | 100 |
| ACCOUNITNG REGULATIONS REQUIREMENTS (UNIFIED ACCOUNTING SYSTEM) | 53.3 | 6.7 | 40.0 | 100 |
| CONFLICTING REGULATIONS (SUCH AS EMPLOYMENT LAW) | 13.3 | 0.0 | **86.7** | 100 |
| LEVEL OF EXPERIENCE IN SCS | 46.7 | 0.0 | **53.3** | 100 |

N=15

This in turn indicates that such regulations that conflict with SCS requirements might have an impact on the ability of SPCs to exert control, through standards, over some costs such as labour. They, therefore, as noted in this section, have shown little emphasis on calculating labour variances (see table 6-7).

In line with this statement (64.3%) of SPCs users of SCS in this sample tend to agree that the level of variances reported has been influenced by the controllability of cost elements, indicating that conflicting regulations probably made some cost elements less controllable, and that the cost elements for which SPCs did establish standards were those that they were able to control.

Thus, this finding might give strong empirical evidence to the beliefs of some organizational theorists that 'Conflicting pressures preclude organizational conformity to the institutional environment in its entirety' (Oliver, 1991: 163).

Another factor worth mentioning, with which SPCs showed agreement is the usage of other techniques such as budgeting in controlling costs (66.7%). When it is difficult to control cost elements at the level of unit of production, they can be controlled through the use of budgets. Clear linkage can be found in the literature between budgets and standard costing (Horngren and Sundem, 1990: 214; Horngren *et al*, 2000: 225; Cress and Pettijohn, 1985: 66). While budgets represent the 'quantitative expression of a proposed plan of action by management for a future time' (Horngren *et al*, 2000: 178) standard costs represent the building blocks of a budget, thus some authors thought 'It may help to think of standard as a budget for the production of a single unit' (Horngren and Sundem, 1990: 214). Budgets can be built relying on past performance rather than using scientific standards and engineering studies (Horngren *et al*, 2000: 225) 'It is therefore possible to have a system of budgetary control without standard costs, although the reverse is highly unlikely' (Watts, 1993: 564).

It might be, therefore, that SPCs did use budgets to control some cost elements, such as labour and overheads, rather than standards. Indirect costs are said to be more controllable by using budgets (Horngren and Sundem, 1990: 215), and labour has become increasingly a fixed rather than a variable cost (Hirsch, 2000: 348).

Finally the SPC users have been divided approximately equally regarding their agreement or disagreement with the statement related to the level of experience they have acquired in operating the system (53.3% agreeing, 46.7% disagreeing). It might be expected that experience of SCS would affect the methods employed. In nearly

half of the SPC users this was not the case, which might suggest that SCS might be employed by SPCs for legitimating rather than managerial purposes.

Based on the above discussion, it might be that the partial use of SCS, in terms of the types of variances and standards used in the SPCs, was affected by some external institutional factors, particularly the existence of conflicting regulations, which limited the ability of SPCs to make extensive usage of the technique. Other internal factors, such as the use of other techniques in controlling cost elements (such as budgeting), the controllability of the cost items and the level of experience in operating the system, might contribute to the partial usage of SCS. The practice of SCS and its scope as depicted in this chapter stands in contrast to the detailed SCS described in most western MA textbooks, despite these methods having been taught in Syria for decades.

NIS suggests that academic and professional ideologies might reach the level of myths and taken for granted patterns of behaviour. There are, however, divergences between those ideologies and what practitioners are really doing in practice. To an outsider, companies might show a general isomorphic appearance in order to legitimate their behaviours. However, they might accommodate MA techniques according to their internal conditions and needs, because of their limited ability to adhere to such ideologies as they are mandated or thought about as socially accepted. There is, therefore, decoupling within the organization so that operational practices differ markedly from textbook prescriptions. This decoupling seems to be more affected by the conflicting institutional pressures in SPCs context.

Finally the practice of SCS in SPCs as documented in this research may lend support to the beliefs of some authors concerning the possibility that some companies may not make full use of SCS and that some of them, for example, 'will use standard labour and standard overhead costs but actual material costs' (Wood & Sangster, 2005: 615).

**6- 4 SCS in the SPCs and the other innovative practices and MA techniques:**

Some MA researchers argue that in the conditions of new manufacturing technologies and highly competitive environment, companies need to use more innovative MA techniques and to replace their traditional MA armouries, which have become increasingly obsolescent (Atkinson, Beaker, Kaplan, Young, 2001; Suliman, Ahmad, Alwi, 2004).

It is claimed that 'A company could survive and prosper only if its cost, quality and product capabilities were as good as those of the best companies in the world' (Atkinson *et al*, 2001: 15).

Techniques such as ABC, TQM, JIT and other non-financial performance measures are thought to be more appropriate in global competitive conditions.

The final question in the survey instrument, therefore, asked the respondents in user companies to indicate the extent to which they use some MA practices. The aim of this question is to document wider practices in the SPC users. There is further support for the potential effect of the usage of some techniques (such as budgeting) that lead to less emphasis on using standards for controlling some cost items, such as overhead and labour, in the SPCs.

Answers to this question are shown in table (6-11).

Table (6-11) shows a heavy reliance of the SPC users of SCS on the other traditional MA systems. All of these companies reported extensive use of budgeting, and (93%) of them reported also extensive use of financial performance measures.

**Table (6-11): Extent of use of some MA techniques in the SPC users of SCS**

| | Not in Use % | Partially in use % | Extensively in use % | Total |
|---|---|---|---|---|
| Just in Time (J.I.T.) | 80 | 20 | 0 | 100 |
| Total quality management (TQM). | 50 | 50 | 0 | 100 |
| Activity based costing (ABC) | 100 | 0 | 0 | 100 |
| Budgetary control | 0 | 0 | 100 | 100 |
| Financial performance measures | 0 | 7 | 93 | 100 |
| Non-financial performance measures | 53 | 40 | 7 | 100 |

N=16

Those companies, however, have exhibited less reliance on the more innovative practices. None of them use (ABC), and the majority (80%) indicated non-use of JIT. Nonetheless, some of the companies mentioned partial use of total quality management (50%) and non-financial performance measures (40%), indicating that some SPCs have started to adopt some innovative practices, with particular emphasis on quality management.

These findings seem consistent with other research in less developed countries. In their review of MA practices in some Asian countries, Suliman, *et al* found that very few companies in the reviewed countries (Singapore Malaysia, China and d India) have adopted ABC or other innovative techniques (2004: 504).

It can be concluded that although the SPC users have shown partial use of SCS they, however, seem to use other techniques in controlling cost elements and securing effective use of resources, particularly through the extensive use of budgeting and financial performance measures.

One of the implications of the findings in this research is that SCS is only one of a synthesis of MA tools and wider practices, which companies use to provide more information, which could enable managers to make better decisions in the conditions of over challenging environment.

## 6-5 Summary of chapter (6):

This chapter has presented a descriptive analysis for the questionnaire results. The first section provided demographical information about the survey respondents and SPCs that took part in this research. The second section aimed to achieve the first objective of the thesis, namely to document the extent to which SCS is in use in SPCs and how it has been implemented.

The demographic statistics have shown that the participating companies differed in size (mean = 1062.39) and that the majority of responding companies were of medium size in Syrian terms (between 251 to 1500 employees). Respondents were financial controllers (58.3%), accounts managers (16.7%) and cost department managers (25%). Respondents' mean years of experience in the position and the company were (10.68), (17.38) respectively, and most of them has had undergraduate certificate (66.7%), while the vast majority did not have a professional qualification (91.7%), which implies in turn a very low diffusion of the professional knowledge in the SPCs.
Findings in this chapter, concerning the practice of SCS, indicated that a considerable percentage (44.4%) of SPCs covered in the cluster sample did use SCS in some form, of which (38.9%) used the system partially.

Partial use has been reflected in the types of standards used and variances reported. All SPC users in this research used either engineering studies (56.2%) or, to a greater extent, average of historical usage (68.8%) to establish direct material quantity standards; few, however, have established direct material price standards (31.2%), direct labour efficiency standards (43.8%), and wage rate standards (6.2%). While

none of the companies have mentioned usage of fixed or variable overheads standard rates. Current attainable standards are the main type of standards used in SPCs (62.5%), yet there is a significant minority that did use basic standards (37.5%). The majority of SPCs that reported usage of SCS revised their standards whenever the variances indicated a change in the standards (50%), while (31.2%) of them left their standards unchanged for a long period of time.

All companies calculated direct material quantity variance, (87.5%) calculated total direct material variance, and (25%) of them mentioned calculation of direct labour efficiency variance. Very little usage, or complete non-use, of all other variances has been documented.

Contrary to the prevailing approach of operating SCS in western countries and some other developing countries, variances in all SPCs are calculated and reported statistically and not recorded in the books, which in turn reflected its effect on the purposes for which standards are used. In general SPCs tend to attach above average to vital importance to using SCS for controlling costs (81.3%), to computing product costs for decision-making (62.5%), and use standards as an aid for budgeting (93.8%). Interestingly, usage of SCS to cost inventory which seems to have vital importance in western countries (see Drury *et al*, 1993: 35) appears to have no importance for SPCs, reflecting the different approach used by SPCs in operating SCS from the prevailing accounting approach well known in the literature.

The partial use of SCS seems to have its linkage with both internal and external institutional factors. Most important is the impact of conflicting regulations; (86.7%)

of SPC users tend to agree that contradictory regulations, such as those related to employment, has influenced the type of standards they have used. This might lend support to the claims of some institutionalists (Oliver, 1991, 163) that contradictory pressures prevent organizational conformity to the institutional demands, which in turn reflects the profound impact of institutional environment in SPCs context, not only on the adoption of SCS as a MA tool, but also on how this MA technique has been actually implemented. Other intra-organizational factors, such as the use of budgets (66.7%) to control cost elements, controllability of cost items (64.3%), and the level of experience (53.3%) have been considered by SPCS as influencing the use of SCS.

Nearly all of the SPC users have shown extensive use of traditional MA techniques, such as budgeting (100%) and financial performance measures (93%). Partial use of other techniques such as non-financial performance measures (40%), TQM (50%), JIT (20%) have been also documented; indicating that although SPCs have shown partial use of SCS they did use extensively some other MA techniques as an aid to control cost elements.

Findings of the practice of SCS in SPCs, presented in this chapter, show also that there is no indication that SCS is actually obsolescent as the critics of this technique anticipated (Howell, 1987; Johnson and Kaplan, 1987; Westra, Srikanth, and Kane, 1996). However, the findings in SPCs context and the research in other developed countries ( Dugdale *et al* 2006) would indicate, probably a change in the role of SCS towards the use of SCS to control direct costs (Direct material in SPCs case) rather

than overheads. This may support the ideas of some MA authors concerning the possibility of partially adopting SCS (Wood and Sangster, 2005).

Another conclusion from comparing the findings of this research with other research in other countries is that, practitioners in different countries continue to use SCS in certain areas, which seem beneficial to them, and probably as a complementary technique with several other MA tools to help manage the businesses more effectively in the new manufacturing environment conditions. This might give support to the impression of some authors who noted that 'In recent years there has been a shift from using variances generated from a standard costing system as the foundation for short-term cost control and performance measurement to treating them as one among a broader set of measures' (Drury, 2000: 766).

Finally, despite the considerable portion of SPCs that reported usage of SCS in some form, the majority (55.6%), did not use SCS and showed resistance to institutional pressures from government mandates, which required the application of this technique in SPCs. This in turn raises the question of the adequacy of institutional theory, which portrayed conformity as an inexorable response to institutional demands, and neglects the effect of the intra-organizational factors relating to the ability and willingness of the organizations to conform to external pressures. The next chapter will deal with the construction of the indexes used to examine the association between the different institutional, technical and intra-organizational willingness and capacity factors and the extent of use of SCS in SPCs.

# Chapter (7): The construction of the indexes related to the institutional, technical and intra-organizational willingness and capacity factors:

## 7-1 introduction

In order to test the main hypotheses in this thesis indexes were developed for the eight constructs, which represent the latent independent variables of interest in this research.

Indexes are composite measures of variables, which rely on more than one item of data. They are "constructed through the simple accumulation of scores assigned to individual attributes" (Babbie, 1992: 167).

Many authors have referred to the fact that multiple item scales are widely used in social research, because they offer several advantages. Firstly, several items are more likely to catch the totality of a general concept particularly when dealing with complex concepts; secondly, using a number of items enables more precise distinctions between participants and more precision in the measurement; thirdly, it helps in developing a more valid measure by avoiding the distortions which can arise from using only one item to measure complex concepts; finally using this type of measurement helps in avoiding the problem of misunderstanding on the part of respondents when only one question is asked, so if respondents misunderstood one question they would be likely to understand and properly answer the other questions related to the same concept (Bryman and Cramer, 2001: 56; De Vaus, 1996: 249-250; 2002: 180-181; Babbie, 2001: 149).

This chapter discusses the different procedures used to develop the indexes that measure the main institutional, technical and intra-organizational willingness and capacity latent variables.

Babbie identified four main steps in the construction of an index, namely the selection of items, examining the empirical relationships between items, index scoring and validation (2001: 152-157). The following subsections will describe each of these stages.

## 7-2 Items selection:

This step involves the selection of indicators that are thought to reflect the different aspects of a concept. The important issue in choosing the items for inclusion in an index is that they should have face validity. That is items intuitively reflect the concept under consideration (Babbie, 2001: 152; Bryman and Cramer, 2001: 55, 66).

All items in the eight groups in this research (see table 5-1 chapter 5) have been selected based on the literature and fieldwork interviews, so that they show face validity. They were further examined by academics and experts in this area, particularly the researcher's supervisor and practitioners in the visited companies.

Babbie argues,

> *"If each of the items [being considered for inclusion in an index] is indeed valid on its face, then the several items should be related to one another empirically"* (1992: 170).

Thus, the empirical relationships between items, which will be examined in the next section, will provide more evidence for the face validity of the selected items.

## 7-3 Test the empirical relationships among constructs' items- the application of alpha analysis of internal reliability:

It is essential that items, which are thought to reflect the same construct, should be inter-correlated with each other (Babbie, 1992: 170; De Vaus, 1996: 255).

Many authors considered internal reliability as a very important and relevant issue concerning the development of multiple item measures ( Bryman and Cramer, 2001: 62; Bryman and Bell, 2003: 88; Garson, 2006[b]; Pallant, 2005: 90). Internal reliability 'raises the question of whether each scale is measuring a single idea and hence whether the items that make up the scale are internally consistent' (Bryman and Cramer, 2001: 62).

As noted in chapter 5, Cronbach's alpha is one of the most frequently used measures of internal consistency (Bryman and Bell, 2003: 88; Cramer, 1994: 269; De Vaus, 1996: 256; 2002: 184; Pallant, 2005: 6; Saunders, et al, 2003: 310). It detects whether several items are actually inter-correlated and reflects also the homogeneity and unidimensionality of a scale ( Litwin, 1995; Garson, 2006[b]). Unidimensionality means that indicators that are supposed to measure a construct should represent only one dimension of a concept (Babbie, 1992: 169). Items that are not inter-correlated are less likely to measure the same thing. Thus, 'high internal consistency is a prerequisite of high validity' (Kline, 1993: 9).

Cramer mentions,

> *"The alpha coefficient determines the internal reliability or consistency of a set of items (or judges) designed to measure a particular characteristic" (1994: 276).*

In developing a scale or an index the items in a scale are usually worded so that if a person answered "yes", for example, for one item he would be more likely to

answer in the same pattern. So 'If some items had been worded so that a 'Yes' signified lower self esteem than a 'No', then the scoring of these items would be reversed' (Cramer, 1994: 276).

The rule of thumb is that Cronbach's alpha should not drop below 0.7, and that an alpha value of 0.7 or more signifies reliable measures (Abramson, 1990: 127; De Vaus, 1996: 256; Kline, 1993: 11; Litwin, 1995: 31; Pallant, 2005: 90). Some researchers, however, referred to values as low as (0.5) as acceptable (Cagwin and Bouwman, 2002: 21), others were rather conservative and suggested an alpha value of 0.8 or more as indicating a high reliability (Bryman and Cramer, 2001: 63; 2005: 77).

It seems from the literature that there is no consensus about the level of the alpha value but the evidence cited above suggests that an alpha value of 0.7 or more indicates high reliability in a composite measure.

For this research variables were classified under eight evaluation groups, which reflect the different institutional, technical and intra-organizational willingness, and capacity factors that might affect the extent of use of SCS in SPCs.

The following procedures were performed in order to test the empirical relationships between items in each of the eight groups, hence their reliability and unidimensionality for inclusion in the indexes that measure the latent variables in this thesis.

1- Some items were worded so that a 'Yes' signified lower evaluation of the construct concerned than a 'No' (negative items), thus the scoring of these items was reversed before performing the subsequent procedure of indexes development (Cramer, 1994: 276; DeVaus, 2002: 168; Pallant, 2005: 90).

2- Items in each group were tested for inter-correlation. That is between items correlations were computed for all items in each group through the construction of a correlation matrix. The correlation matrixes for the eight groups were then scrutinized. If two items were perfectly correlated with each other, then only one of them need be included in the index, because in this situation the two items measure the same idea (singularity) (Babbie, 1992: 170). Field, suggests the elimination of items with correlation coefficients greater than 0.9, because this signifies the problem of 'singularity in the data' (2000: 453).

Particular consideration was shown also for the elimination of any item that was not correlated, or negatively correlated with other items in each index (Babbie, 2001: 153-154).

3- The second procedure aimed at assessing the unidimensionality of the items in each group that were intended to form one index. The interest centres at this step in examining the multivariate relationships among items (Babbie, 2001: 156).

It is important that a person's response for an individual item should reflect the pattern of responses on other items. To check this, a correlation co-efficient between respondents' responses on one item and their responses to other items was calculated. This coefficient is referred to as 'the item to scale co-efficient' (De Vaus, 1996: 255) (Corrected Item-Total Correlation in SPSS 12), and indicates the extent to which 'each item correlates with the total score' (Pallant, 2005: 92). The rule of thumb is that if an item's coefficient is less than 0.3, this warns that the item is not related to the other items that are thought to form the index, and the item should be eliminated (De Vaus, 1996: 255; 2002: 185; Pallant, 2005: 92).

4- When considering the elimination of an item in all the above-mentioned cases, the selection was based on examining Cronbach's alpha value if the item is

deleted, items were deleted if overall reliability was increased (Bryman and Cramer, 2001: 65).

5- Having identified the final items that should be included in each index, Cronbach's alpha was calculated for the retained items in each group. High Cronbach's alpha value, of 0.7 or more, was used as indicator of the reliability of the indexes and the unidimensionality of items embodied in them.

6- To validate the summation of the scores of individual items to form the indexes, Tukey's test of non-additivity for each group of items was calculated. Tukey's test of non-additively is an important statistic, which tests the possibility of adding the item scores of one scale together. For this test, a significant value ($P \leq 0.05$) leads the researcher to conclude that items are not additive. If items were, however, found to be not additive (Tukey's test is significant), it would be possible to reach additivity by using a transformed form of the indicators. In a footnote to the Tukey's test output, SPSS gives an estimation of the power to which items in a group would need to be raised in order to be additive (Garson, 2006[a]: 9 of 15).

The following subsections will discuss the application of the above-mentioned procedures for testing the empirical relationships between the items in each of the eight groups that measure the main constructs in this thesis.

### 7-3-1 Test the empirical relationships between the items related to the coercive pressures:

As noted earlier, five items were developed to measure the construct "coercive pressures". The items described different aspects of supervisory authority

influence on introducing SCS in SPCs. Supervisory authority (S.A.), as defined in the questionnaire, means any public entity upon which a given SPC is dependent and works under its supervision.

At the first step of developing the index that measures this variable both the empirical relationships among the selected individual items (bivariate), and relationships among each item and all other items (Multivariate - Corrected Item-Total Correlation) were tested (See De Vaus, 1996: 256, Babbie 2001: 156).

Table (7-1) summarizes the correlation matrix (between items relationships) of items related to the construct "coercive pressures".

**Table (7-1): Correlation matrix (bivariate relationships) for the items related to the construct "coercive pressures"**

| Number of items NOI = 5 | **S. A. Impact on the decision of using SCS** | **S.A. seriousness in introducing SCS** | **S. A. support for introducing SCS** | **S.A. frequently requires SCS reports** | **S.A. required the use of SCS in the industry** |
|---|---|---|---|---|---|
| **S. A. Impact on the decision of using SCS** | 1.000 | 0.859 | 0.750 | 0.674 | 0.696 |
| **S.A. seriousness in introducing SCS** | 0.859 | 1.000 | 0.752 | 0.798 | 0.787 |
| **S. A. support for introducing SCS** | 0.750 | 0.752 | 1.000 | 0.699 | 0.778 |
| **S.A. frequently requires SCS reports** | 0.674 | 0.798 | 0.699 | 1.000 | **0.912** |
| **S. A. required the use of SCS in the industry** | 0.696 | 0.787 | 0.778 | **0.912** | 1.000 |

A scrutiny of table (7-1) shows that all indicators of this construct are highly correlated with each other indicating that these items are more likely to measure the intended underlying concept (Coercive pressures). It can be seen, however, that the items, "S.A required the use of SCS in the industry" and "S.A. frequently

requires SCS reports" are very highly correlated (correlation coefficients 0.912 > 0.9). This indicates the problem of 'singularity in the data' (Field, 2000: 453).

To determine which item should be deleted and to test the unidimensionality of items, the total item correlations and the associated Cronbach's alpha if item deleted were calculated. A total item correlation coefficient less than (0.3) indicates that the related item is not well correlated with other items. It should, therefore, be eliminated, because it is less likely to measure the same concept (De Vaus, 1996: 255; 2002: 185).

For this construct "coercive pressures" all items had high total item correlation coefficients (> 0.3) indicating the unidimensionality of theses items. However, to solve the problem of singularity between the items "S.A required the use of SCS in the industry" and "S.A. frequently requires SCS reports" the latter item was deleted, because its elimination is associated with a greater value of Cronbach's alpha (0.930) as shown in the column "Cronbach's Alpha if Item Deleted" in table (7-2).

**Table (7-2): Total item correlation and the associated Cronbach's alpha if item deleted "coercive pressures"**

| NOI = 5 | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|
| **S. A. impact on the decision of using SCS** | 0.812 | 0.936 |
| **S.A. seriousness in introducing SCS** | 0.885 | 0.923 |
| **S. A. support for introducing SCS** | 0.813 | 0.936 |
| **S.A. frequently requires SCS reports** | 0.849 | **0.930** |
| **S. A. required the use of SCS in the industry** | 0.876 | **0.925** |

Having done that, Cronbach's alpha and Tukey's tests for nonadditivity were conducted on the remaining items. The results of Cronbach's alpha (0.930) and the level of significance of Tukey's tests (0.897) mean that the remaining four items seem to be a highly reliable measure of the construct "Coercive pressures" and the respondents' scores on these items are actually additive.

### 7-3-2 Test the empirical relationships between the items related to the technical (competitive) pressures:

The construct "competitive pressures" measures the influence of the competitive environment. 5 items were initially embodied in this group. Table (7-3) shows the correlation matrix of the items embodied in this group.

**Table (7-3): Correlation matrix (bivariate relationships) for the items related to the construct competitive pressures**

| NOI = 6 | Facing intensive competition | Large number of competitors | Price competition is intense | Quality competition | Customer service competition |
|---|---|---|---|---|---|
| **Facing intensive competition** | 1.000 | **0.933** | 0.871 | 0.439 | 0.760 |
| **Large number of competitors** | **0.933** | 1.000 | 0.838 | 0.438 | 0.765 |
| **Price competition is intense** | 0.871 | 0.838 | 1.000 | 0.400 | 0.723 |
| **Quality competition** | 0.439 | 0.438 | 0.400 | 1.000 | 0.417 |
| **Customer service competition** | 0.760 | 0.765 | 0.723 | 0.417 | 1.000 |

A scrutiny of table (7-3) indicates that, although the individual items, in general, are well correlated with each other, the items "facing intensive competition" and "large number of competitors" are very highly correlated (Correlation = 0.933). They are more likely then to reflect the same idea. Thus one item should be deleted, because including one of the two items in the index means the other item would add very little or nothing to the index if it were also included (Babbie, 2001).

To determine which item should be deleted and to further examine the unidimensionality of the items embodied in this construct, total item correlation test and alpha values associated with the deletion of each item were calculated as shown in table (7-4).

**Table (7-4): The results of total item correlation and Cronbach's alpha values associated with the deletion of each item "Competitive pressures"**

| NOI = 7 | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|
| **Facing intensive competition** | 0.888 | **0.845** |
| **Large number of competitors** | 0.878 | **0.848** |
| **Price competition is intense** | 0.826 | 0.860 |
| **Quality competition** | 0.457 | 0.945 |
| **Customer service competition** | 0.769 | 0.871 |

As can be seen from table (7-4) the Corrected Item-Total Correlation coefficients for all the items in this group are greater than (0.3) indicating the unidimensionality of these items. To avoid the problem of singularity between the first two items detected above, the researcher decided to eliminate the item "large number of competitors" because its deletion is associated with higher Cronbach's alpha (0.848). The researcher then recalculated Cronbach's alpha and Tukey's test on the remaining items. The final results of Cronbach's alpha (0.848) and level of significance of Tukey's test (0.790) on those items indicate that they seem to reflect reliably the intended underlying concept "Competitive pressures" and respondents' scores on these items are additive.

### 7-3-3 Test the empirical relationships between the items related to the cognitive capacity:

The researcher developed 6 items, which were intended to measure the "Cognitive capacity" of SPCs to use SCS. Tables (7-5) and (7-6) present the correlation matrix and results of alpha analysis on the items embodied in this group.

As can be seen from table (7-5) all the individual items are well correlated with each other.

**Table (7-5): Correlation matrix (bivariate relationships) for the items related to the construct "Cognitive capacity"**

| | Training received by staff | Staff experience on SCS | Top management knowledge on SCS | Middle management knowledge on SCS | Accountants knowledge on SCS | Receiving SCS experts consultancy |
|---|---|---|---|---|---|---|
| **Training received by staff** | 1.000 | 0.889 | 0.780 | 0.710 | 0.736 | 0.711 |
| **Staff experience on SCS** | 0.889 | 1.000 | 0.767 | 0.864 | 0.805 | 0.582 |
| **Top management knowledge on SCS** | 0.780 | 0.767 | 1.000 | 0.860 | 0.613 | 0.635 |
| **Middle management knowledge on SCS** | 0.710 | 0.864 | 0.860 | 1.000 | 0.684 | 0.549 |
| **Accountants knowledge on SCS** | 0.736 | 0.805 | 0.613 | 0.684 | 1.000 | 0.447 |
| **Receiving SCS experts consultancy** | 0.711 | 0.582 | 0.635 | 0.549 | 0.447 | 1.000 |

The total item correlations shown in table (7-6) provide further support for the unidimensionality of the items embodied in this group as all of the items had coefficient values greater than (0.3). The overall high Cronbach's alpha value (0.936) and the insignificant value of Tukey's test (0.478), indicate that the items seem to be reliable indicators of the intended construct and their scores are additive.

**Table (7-6): The results of total item correlations, Cronbach's alpha and Tukey's tests values on the items related to the construct "cognitive capacity"**

| **Number of items N = 6** | **Corrected Item-Total Correlation** |
|---|---|
| Training received by staff | 0.888 |
| Staff experience on SCS | 0.910 |
| Top management knowledge on SCS | 0.840 |
| Middle management knowledge on SCS | 0.841 |
| Accountants' knowledge on SCS | 0.743 |
| Receiving SCS experts consultancy | 0.649 |
| Tukey's Test for Nonadditivity, Significance = **0.478** | Cronbach's Alpha= **0.936** |

### 7-3-4 Test the empirical relationships between the items related to the organizational capacity:

The construct "organizational capacity" refers to the managerial capabilities and the availability of other resources that have been considered in the literature as influencing the use of SCS. To measure this construct the researcher developed 7 items that reflect the different aspects of the managerial and organizational capacity of SPCs in addition to the organizational size. Size was initially measured using number of employees, which was then grouped into 7 groups as discussed in chapter 6.

It should be noted that this group has embodied some negative items. Thus agreement by respondents with these items indicates a lower score of the construct being measured. For example the item "Lack of qualified scientific management (LQM)" is a negative item. Thus agreement with this item indicates lower organizational capacity, and respondents who agreed on this item should, therefore, receive lower scores in order to get a correct evaluation for the construct being measured. Thus, respondents' scores on the individual negative items of this construct were reversed before running alpha analysis.

Table (7-7) shows the correlation matrix of items included in this group. As can be seen from the table most of the items in this group seem to be well correlated with each other with the exception of two items "SIZE" and "Computerization of costing systems (COM)".

The first item shows negative correlation with the majority of the other items. The item computerization also seems not well correlated with other items. It is also

negatively correlated with the item "Out of date manufacturing resource (ODMT)".

This might indicate that these two items don't describe the same underlying construct.

**Table (7-7): Correlation matrix (bivariate relationships) of the items related to the construct "organizational capacity"**

| NOI= 8 | TMS | LQM | MI | LQTS | LCOP | COM | ODMR | SIZE |
|---|---|---|---|---|---|---|---|---|
| **Top management support to SCS (TMS)** | 1.000 | 0.681 | 0.659 | 0.431 | 0.411 | 0.234 | 0.400 | -0.295 |
| **Lack of qualified scientific management (LQM)** | 0.681 | 1.000 | 0.708 | 0.414 | 0.528 | 0.101 | 0.541 | -0.352 |
| **Management inertia (MI)** | 0.659 | 0.708 | 1.000 | 0.528 | 0.574 | 0.196 | 0.437 | -0.363 |
| **Lack of qualified technical staff (LQTS)** | 0.431 | 0.414 | 0.528 | 1.000 | 0.547 | 0.461 | 0.364 | -.0163 |
| **Lack of co-operation between technical and accounting staff (LCOP)** | 0.411 | 0.528 | 0.574 | 0.547 | 1.000 | 0.265 | 0.303 | -0.452 |
| **Computerization of costing systems (COM)** | 0.234 | 0.101 | 0.196 | 0.461 | 0.265 | 1.000 | **-0.093** | 0.073 |
| **Out of date manufacturing resources (ODMR)** | 0.400 | 0.541 | 0.437 | 0.364 | 0.303 | -0.093 | 1.000 | -0.263 |
| **(SIZE)** | **-0.295** | **-0.352** | **-0.363** | **-0.163** | **-0.452** | **0.073** | **-0.263** | 1.000 |

A further investigation of the table (7-8), which presents the total item correlation test and alpha values associated with the deletion of each item, seems to support this impression. The item SIZE has a negative corrected item-total correlation coefficient indicating that it should not be included in the index. Similarly the item COM, which is negatively correlated with the item ODMR, has the lowest item-total correlation coefficient (0.301) thus it might not be measuring the same construct.

Thus the researcher decided to eliminate these two items, because their deletion would result in higher alpha values as the column "Cronbach's Alpha if Item deleted" in table (7-8) shows.

**Table (7- 8): The results of total item correlation test and alpha values associated with the deletion of each item "organizational capacity".**

| NOI-8 | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|
| Top management support to SCS (TMS) | 0.642 | 0.662 |
| Lack of qualified scientific management (LQM) | 0.669 | 0.655 |
| Management inertia (MI) | 0.710 | 0.646 |
| Lack of qualified technical staff (LQTS) | 0.650 | 0.660 |
| Lack of co-operation between technical and accounting staff (LCOP) | 0.547 | 0.683 |
| Computerization of costing systems (COM) | **0.301** | 0.731 |
| Out of date manufacturing resources (ODMR) | 0.420 | 0.711 |
| (SIZE) | **-0. 371** | 0.838 |

Cronbach's alpha and Tukey's test were recalculated for the remaining 6 items. The final results of Cronbach's Alpha value (0.860) and level of significance of Tukey's test (0.356) indicate that the remaining six items in this group seem unidimensional and reliable indicators of the construct "organizational capacity" and respondents' scores on these items are additive.

Although the researcher is not interested in the individual items, but in the main construct they are supposed to form, he decided to check whether those eliminated items, which were not represented in the construct, might have any association with the extent of use of SCS in SPCs. To do so Kendall's tau test of association was conducted on the two eliminated items in this group and the variable "extent of use of SCS", no significant relationships were found between the extent of use of SCS and the items computerization ($T = 0.161$, $P = 0.290 > 0.05$) and size[11] ($T = -0.210$, $P = 0.126 > 0.05$). However, because size is one of the important

[11] The original number of employees (before coding) was used to examine the relationship between size and the extent of use of SCS.

contingent variables in M.A. research, the researcher made another check to see whether or not the users and nonusers of SCS are different in terms of organizational size. Thus, SPCs respondents were divided into two groups, those who reported use of SCS in some form (N=16) and those who reported non-use (N=20).

The two groups were then compared in terms of the number of employees. Given that the variable "SIZE" is of interval level, the t test could be appropriate to compare the two groups in terms of the mean numbers of employees. However, recall that the variable "SIZE", measured using the number of employees, is not normally distributed (see table 5-9 chapter 5), then Mann-Whitney test might be more appropriate in this case (Field, 2005: 522). As a conservative procedure the researcher conducted two tests. Results of these two tests are shown in table (7-9). The level of significance of t test (P = 0.615) and Mann- Whitney test (P = 0.126) reported in this table means that no significant difference is detected between user and non-user companies in terms of their size.

**Table (7-9): Results of applying two sample t test and Mann-Whitney test to compare the mean numbers of employees in the user and non-user SPCs of SCS**

| **Number of employees** | **N** | **Mean** | **t** | **Mean Rank** | **Mann-Whitney U** |
|---|---|---|---|---|---|
| **SPC non users of SCS** | 20 | 1144.45 | 0.508 | 20.90 | U = 112.000<br>Z = -1.528 |
| **SPC users of SCS** | 16 | 959.81 | | 15.50 | |
| Degrees of freedom = 35, Significance (2-tailed)= **0.615** | | | | Significance. (2-tailed)= **0.126** | |

It should be noted that the coefficient of Kendall's tau is negative, indicating negative relationship between size and the use of SCS (level of conformity), which means that large SPCs tend to adopt a more active strategy in response to

institutionally induced SCS. While this finding might contrast with some results in MA research, it is, however, consistent with findings in some organizational theory research, where larger organizations were found to be more resistant to institutional pressure to change (See Clemens and Douglas, 2005: 1210). This provides evidence also for the mixed picture of the impact of size on organizational change (See Barnett and Carroll, 1995: 221). The relationship between size and level of conformity in this research, however, is not significant, which in turn indicates that size seems irrelevant in affecting the responsiveness of SPCs to the institutionally induced SCS.

### 7-3-5 Test the empirical relationships between the items related to willingness to attain legitimacy:

Three items were developed to measure the construct "perceived legitimacy". Table (7-10) shows the correlation matrix of items related to this construct.

**Table (7-10): Correlation matrix (bivariate relationships) for items related to the construct "perceived legitimacy"**

| NOI= 3 | Willing to use SCS because other companies do so | Willing to use SCS to satisfy S.A | Willing to use SCS to avoid questioning |
|---|---|---|---|
| Willing to use SCS because other companies do so | 1.000 | 0.653 | 0.691 |
| Willing to use SCS to satisfy S.A | 0.653 | 1.000 | 0.886 |
| Willing to use SCS to avoid questioning | 0.691 | 0.886 | 1.000 |

It can be seen from the above table that, items related to this construct seem to be well correlated. This in turn implies high total item correlation coefficients as table (7-11) shows, indicating the unidimensionality of these items. Alpha value and level of significance of Tukey's test support this finding, which means that the

items in this category are unidimensional and reliable indictors of the construct "perceived legitimacy".

**Table (7-11): Results of alpha analysis on the final items related to the construct "perceived legitimacy"**

| **NOI =3** | **Corrected Item-Total Correlation** |
|---|---|
| **Willing to use SCS because other companies do so** | 0.692 |
| **Willing to use SCS to satisfy S.A** | 0.833 |
| **Willing to use SCS to avoid questioning** | 0.866 |
| Tukey's Test for Nonadditivity<br>Significance = **0.767** | Cronbach's Alpha = **0 .895** |

### 7-3-6 Test the empirical relationships between the items related to the willingness to attain economic gains:

Three items were initially developed to measure the construct "Perceived economic gains". Table (7-12) presents the correlation matrix of the items related to this construct.

**Table (7-12): Correlation matrix (bivariate relationships) for items related to the construct "Perceived economic gains"**

| NOI = 3 | **Willing to improve efficiency** | **Willing to control managers** | **Willing to use SCS to control workers** |
|---|---|---|---|
| **Willing to improve efficiency** | 1.000 | 0.530 | 0.409 |
| **Willing to control managers** | 0.530 | 1.000 | 0.495 |
| **Willing to use SCS to control workers** | 0.409 | 0.495 | 1.000 |

Correlation coefficients for the three items seem high, indicating that the individual items are well related to each other. Unidimensionality of these items was further examined through investigating the multivariate relationships between each item and all other items using alpha analysis and the Tukey's test. The results of alpha analysis, corrected item-total correlation and Tukey's tests, presented in

table (7-13), suggest that there is sufficient evidence that these items are actually reliable and unidimensional indicators of the construct "Perceived economic gain".

**Table (7-13): Results of alpha analysis on the final items related to the construct "Perceived economic gains"**

| NOI = 3 | Corrected Item-Total Correlation |
|---|---|
| **Willing to improve efficiency** | 0.537 |
| **Willing to control managers** | 0.610 |
| **Willing to use SCS to control workers** | 0.515 |
| Tukey's Test for Nonadditivity Significance = **0.819** | Cronbach's Alpha = **0.729** |

### 7-3-7 Test the empirical relationships between the items related to the willingness to attain self-interest:

The researcher developed three items to measure the construct "Perceived self-interest". Table (7-14) presents the correlation matrix of these items.

As can be seen from the table, the three items seem to be well correlated. This implies that they are more likely to measure the same thing.

**Table (7-14): Correlation matrix (bivariate relationships) for items related to the construct "Perceived self-interest"**

| NOI = 3 | Lack of personal incentive for top management | Lack of personal incentive for middle management | Fear of holding responsibility |
|---|---|---|---|
| **Lack of personal incentive for top management** | 1.000 | 0.887 | 0.510 |
| **Lack of personal incentive for middle management** | 0.887 | 1.000 | 0.541 |
| **Fear of holding responsibility** | 0.510 | 0.541 | 1.000 |

Further investigation to the multivariate relationships between these items, as shown in table (7-15), and the high value of Cronbach's alpha (0.848) and the insignificant value of Tukey's test (0.1), give more confidence that these items are

unidimensional and reliable indicators of the construct "Perceived self-interest" and respondents' scores on these items are additive.

**Table (7-15): Results of alpha analysis on the final items related to the construct "perceived self-interest"**

| NOI = 3 | Corrected Item-Total Correlation |
|---|---|
| **Lack of personal incentive for top management** | 0.804 |
| **Lack of personal incentive for middle management** | 0.825 |
| **Fear of holding responsibility** | 0.542 |
| Tukey's Test for Nonadditivity Significance = **0. 100** | Cronbach's Alpha = **0.848** |

### 7-3-8 Test the empirical relationships between the items related to the suitability of technological task requirements:

Four items were developed to measure the construct "Task requirements". The correlation matrix of these items is presented in table (7-16).

**Table (7-16): Correlation matrix (bivariate relationships) for items related to the construct "Technological task requirements"**

| NOI = 4 | Operations repetitiveness | Limited number of products | Standardized products | Clear relationship between inputs and outputs |
|---|---|---|---|---|
| **Operations repetitiveness** | 1.000 | 0.485 | 0.419 | 0.216 |
| **Limited number of products** | 0.485 | 1.000 | 0.779 | 0.060 |
| **Standardized products** | 0.419 | 0.779 | 1.000 | 0.257 |
| **Clear relationship between inputs and outputs** | 0.216 | 0.060 | 0.257 | 1.000 |

As the correlation matrix shows the item "clear relationship between inputs and outputs" is not well correlated with the other individual items. To decide whether this item should be eliminated and to further investigate the unidimensionality and the reliability of the items in this group, multivariate relationships between the different items, and the associated Cronbach's alpha values if an item were deleted are calculated and presented in table (7-17).

**Table (7-17): Results of alpha analysis on the items related to the construct "task requirements"**

| NOI = 4 | Corrected Item-Total Correlation | Cronbach's Alpha if Item Deleted |
|---|---|---|
| Operations repetitiveness | 0.499 | 0.680 |
| Limited number of products | 0.716 | 0.533 |
| Standardized products | 0.753 | 0.494 |
| Clear relationship between inputs and outputs | **0.197** | 0.795 |

It can be seen from table (7-17) that the item "clear relationship between inputs and outputs" is not well related to other items, with item-total correlation coefficient of (0.197) which is less than the minimum value (0.3) suggested by some authors (De Vaus, 1996: 255; Pallant, 2005: 92). Thus the researcher decided to eliminate this item.

Alpha analysis was then repeated on the three remaining items. However, although the new Cronbach's alpha value (0.795) seemed high, Tukey's Test for Nonadditivity was significant (level of Significance = 0.000), which implied that the items are not additive. It is suggested that to reach the level of additivity in such situation, respondents' scores on these items can be transformed by raising them to the power shown as a footnote in Tukey's test output in SPSS program (this power was 5.54 in the output of Tukey's test for the three remaining items in this group). To avoid raising the items to a very high power, which might obscure the differences between cases, the researcher tried firstly a lower power (Garson, 2006[c]: 9 of 12). Using the power 3 transformation of the three items resulted in an insignificant value of Tukey's test (P = 0.131). The associated Cronbach's alpha value for the transformed items was (0.793) indicating that the transformed items of this construct are reliable indicators of the concept "Task requirements" and the respondents' score on these items are additive. The transformed items of this

group were used to form an index, which was used in the subsequent analysis of hypotheses testing.

To check whether the eliminated item "clear relationship between input and output", which was not represented in this construct, might have any association with the extent of use of SCS in SPCs, Kendall's tau test of association was conducted to test the association between this item and the extent of use of SCS. No significant relationship was found between the extent of use of SCS and this item ($P = 0.110 > 0.05$).

Based on the discussions in this section, table (7-18) summarizes the results of the procedures performed to test the reliability and the unidimensionality of the items in the eight groups of variables and the final items retained to develop each of the indexes that measure the main constructs in this research.

**Table (7-18): Summary of the results of alpha analysis and Tukey's test on the eight groups of items that measure the main constructs in the thesis**

| Constructs | Number of Original items | Items deleted | Items Retained | Cronbach's Alpha | Tukey's Test for Nonadditivity "Levels of Significance" |
|---|---|---|---|---|---|
| **Coercive pressures** | 5 | 1 | 4 | 0.930 | 0.897 |
| **competitive pressures** | 5 | 1 | 4 | 0.848 | 0.790 |
| **Cognitive capacity** | 6 | - | 6 | 0.936 | 0.478 |
| **Organizational capacity** | 8 | 2 | 6 | 0.860 | 0.356 |
| **Perceived legitimacy** | 3 | - | 3 | 0.895 | 0.767 |
| **Perceived economic gains** | 3 | - | 3 | 0.729 | 0.819 |
| **Perceived Self -interest** | 3 | - | 3 | 0.848 | 0.100 |
| **Task requirements** | 4 | 1 | 3 | 0.793 | 0.131 |

Figures in the above table demonstrate that all the retained items in each group are highly reliable indicators of the intended constructs (alpha > 0.7). The levels of significance of Tukey's test indicate also that the items in each group are additive, which in turn justifies the summation of their scores to form the related indexes that measure the underlying constructs.

## 7- 4 Indexes scoring:

Having examined the empirical relationships among the items in each of the eight groups that are intended to measure the underlying concepts, and demonstrated their reliability and unidimensionality, the next step in developing the indexes is to calculate their scores.

For each individual item from the set of items that are supposed to form one index, a respondent will receive a score, depending on his or her answers. The score is allocated to each answer 'depending on how favourable the answer is to the attitude being measured' (De Vaus, 1996: 250). Respondent's scores on the individual items are then summed to give an overall score for the index (index score).

Thus, a respondent's score for an index can be calculated through the summation of his or her scores for the individual items, which form this index (De Vaus, 1996: 250; Bryman and Cramer, 2001: 47; Babbie, 2001, 168). One issue when summing the scores of items is whether the researcher will give weights to certain items or not. Babbie suggests that 'items be weighted equally' as practice seems to support this method (2001: 159). Accordingly the researcher decided to weight items in each index equally.

To calculate the index scores in this research the following steps were performed:

1- Respondents' scores for each of the retained individual items in each group were summed, which in turn gives their scores for the index. The researcher used the "Compute" command in SPSS 12 to perform this procedure in order to compute the new composite variables that represent the indexes that measure the eight constructs of interest in this thesis (see Bryman and Cramer, 2001: 47, De Vaus, 2002: 186). The index raw scores were used in the subsequent analysis to test the main hypotheses in this research. Table (7-19) presents descriptive statistics of the indexes used to measure the main constructs in this thesis.

2- Index scores were then recoded. This procedure served two purposes. The first is that recoding the indexes helped to make sense of them and provided a descriptive analysis for the SPC respondent scores related to each of the eight constructs and clarified their relationships with the extent of use of SCS. Clearly if a respondent received a high score on one index this would mean a high valuation of the concept being measured comparing to other respondents who received low scores. The second, and the most important, is to serve the subsequent analysis in this research related to the application of QCA technique, which requires the dichotomization of the variables as will be seen later.

Thus, in order to recode respondents' scores into dichotomous variables a distributional approach was adopted (See De Vaus, 2002: 164-166). De Vaus summarized the logic of this approach and mentioned that

*"we can classify a particular value of variable as high or low depending on the values of other people in the sample. This approach to collapsing categories has the advantage of letting the data define what is low, medium or high rather than us imposing some external, unrealistic definition" (2002: 165).*

**Table (7-19): Descriptive statistics of the indexes related to the main composite measures in the thesis**

| Indexes | Mean | Median | S.E of Mean | SD | Min. | Max. | Number Of items |
|---|---|---|---|---|---|---|---|
| **Competitive pressures** | 20.97 | 22 | 1.104 | 6.622 | 8 | 28 | 4 |
| **Coercive pressures** | 16.19 | 16 | 1.222 | 7.332 | 5 | 28 | 4 |
| **Cognitive capacity** | 22.17 | 21.5 | 1.579 | 9.473 | 7 | 41 | 6 |
| **Perceived legitimacy** | 11.69 | 12 | .866 | 5.198 | 3 | 20 | 3 |
| **Organizational capacity** | 26.92 | 30.5 | 1.504 | 9.022 | 7 | 41 | 6 |
| **Perceived Self -interest** | 14.97 | 16.50 | .789 | 4.736 | 3 | 21 | 3 |
| **Perceived economic gains** | 11.50 | 12 | .692 | 4.151 | 3 | 18 | 3 |
| **Task requirements 3 items- power 3 transformed** | 617.91 | 648 | 41.08 | 246.5 | 24 | 1029 | 3 |

Recoding relying on this approach requires splitting up the sample into approximately equal groups of cases, by choosing cut off points for each variable, which will lead to subdividing the variable into new equal sized groups. So, to recode each of the indexes into dichotomous variables, cut off points (of the raw scores), which divided the sample into roughly two equal groups, were selected (approximately the 50 cumulative percentages) (De Vaus, 2002: 166). The selection of the cut off points was performed based on the median score which represents the middle of the distribution of a variable. So, for example, to dichotomize the latent variable "cognitive capacity" into a dichotomous variable, the distribution of this composite variable was produced and the median score (21.5) was selected as the cut off point. Respondents that received scores lower than the cut off point (21.5) received a new code (0), which indicates low cognitive capacity and those that received scores equal to or greater than this cut off point were given a new code (1) indicating high cognitive capacity. The same

procedure was applied to the other remaining seven composite variables as will be discussed in chapter 9.

## 7-5 Tests for the index validity:

If indexes developed in this thesis are actually valid, the items embodied in each index should be highly correlated with the index itself. This type of validity is called internal validity (Babbie, 2001: 162). Thus to demonstrate the internal validity of the eight indexes, given the ordinal level of measurement of the items and the indexes' raw scores, the researcher computed Kendall's tau correlation coefficients for each index with its composite items. The results were presented in table (7-20).

As the table shows, all items, which constitute each of the eight indexes in this thesis, are very highly correlated with the related index. It can be concluded that the indexes used to measure the constructs of interest in this research seem to be valid measures of those constructs.

The next chapter will clarify the relationships between the indexes developed in this chapter and the extent of use of SCS and test the hypotheses related to the association between the extent of use of SCS in SPCs and the eight composite coercive institutional, technical (competitive) and intra-organizational willingness and capacity variables.

**Table (7-20): Kendall's tau correlation coefficients for each index with its composite items**

| Items in the index | Items to index Correlation coefficients |
|---|---|
| **Coercive pressures index's items** | |
| S.A IMPACT ON THE DECISION OF USING SCS | 0.804 |
| S.A. SERIOUSNES IN INTRODUCING SCS | 0.831 |
| S.A SUPPORT TO INTRODUCING SCS | 0.774 |
| S.A REQUIRED THE USE OF SCS IN THE INDUSTRY | 0.774 |
| **Competitive pressures index's items** | |
| FACING INTENSIVE COMPETITION | 0.652 |
| PRICE COMPETITION INTENSITY | 0.717 |
| QUALITY COMPETITION | 0.653 |
| CUSTOMER SERVICE COMPETITION | 0.709 |
| **Cognitive capacity index's items** | |
| TRAINING RECEIVED BY STAFF | 0.800 |
| STAFF EXPERIENCE ON SCS | 0.815 |
| TOP MANAGEMENT KNOWLEDGE ON SCS | 0.767 |
| MIDL MANAGEMENT KNOWLEDGE ON SCS | 0.768 |
| ACCOUNTANTS KNOWLEDGE ON SCS | 0.680 |
| RECEIVING SCS EXPERTS CONSULTANCY | 0.607 |
| **Organizational capacity index's items** | |
| TOP MANAGEMENT SUPPORT TO SCS | 0.693 |
| LACK OF QUALIFIED SCIENTIFIC MANAGEMNT | 0.738 |
| MANGEMENT INTERTIA | 0.660 |
| LACK OF QUALIFIED TECHNICAL STAFF | 0.558 |
| LACK OF CO-OPERATION BETWEEN TECHNICAL AND ACCOUNTANTING STAFF | 0.606 |
| OUT OF DATE MANUFACTURING RESOURCES | 0.477 |
| **Perceived legitimacy index's items** | |
| WILLING TO USE SCS BECAUSE OTHER COMPANIES DO SO | 0.760 |
| WILLING TO SATISFY SUPPERVISORY AUTHORITY | 0.810 |
| WILLING TO AVOID QUESTIONING | 0.872 |
| **Perceived economic gains index's items** | |
| WILLING TO IMPROVE EFFICIENCY | 0.656 |
| WILLING TO CONTROL MANGERS | 0.718 |
| WILLING TO USE SCS TO CONTROL WOKERS | 0.703 |
| **Perceived self-interest index's items** | |
| LACK OF PERSONAL INCENTIVE FOR TOP MANAGEMNT | 0.816 |
| LACK OF PERSONAL INCENTIVE FOR MIDLE MANAGEMNT | 0.843 |
| FEAR OF HOLDING RESPONSIBLITY | 0.690 |
| **Task requirements index's items** | |
| LIMITED NUMBER OF PRODUCTS (transformed) | 0.730 |
| STANDARDIZED PRODUCTS (transformed) | 0.729 |
| OPERATIONS' REPETITIVENESS (transformed) | 0.661 |

## 7-6 Summary of Chapter 7:

This chapter discussed the procedures performed to develop the indexes that measure the different composite variables of interest in this thesis. Items included in each of the eight groups that are intended to measure the constructs, coercive pressures, competitive pressures, cognitive capacity, organizational capacity, task requirements, perceived legitimacy, perceived self-interest, and perceived economic gains, were examined for reliability and unidimensionality using Cronbach's alpha test of internal consistency. The summation of the items' scores in each group was also tested using Tukey's test for nonadditivity. Some items in some groups were deleted due, either to very high correlations (> 0.9) with other item(s) in the group (singularity), or because the deleted items were not well correlated with the other items in the group, indicating that they are less likely to measure the same concept. Results of Cronbach's alpha test and Tukey's test for nonadditivity on the retained items in each of the eight groups of variables have shown that these items are highly reliable and unidimensional indicators of the constructs being measured in this thesis, and respondents' scores on these items are additive.

After demonstrating the unidimensionality and additivity of items in each group indexes were developed for the different constructs using the "Compute" command in SPSS 12. Indexes' raw scores were then used in the subsequent analysis of hypotheses' testing. Respondents' scores on the different indexes were also recoded as dichotomous in order to serve the QCA application and to provide some descriptive analysis as discussed in the following chapters.

# Chapter (8): Test the association between the institutional technical and intra-organizational willingness and capacity factors and the extent of use of SCS in SPCs:

## 8-1 Introduction:

This chapter aims to achieve the second objective of this thesis, namely to test the hypotheses related to the association between the different institutional technical and intra-organizational willingness and capacity factors and the extent of use of SCS. This step of data analysis will focus on revealing the most relevant factors that are likely to affect conformity or resistance of SPCs to the adoption of institutionally induced SCS. It will, therefore, simplify the subsequent analysis, which relies on the application of qualitative comparative (QCA) and fuzzy set analyses, by focusing on exploring the patterns of relationships among the most relevant factors. That is the factors that are significantly associated with the extent of use of SCS in SPCs.

To fulfil the aim of this chapter the following steps were performed:

1. The null hypotheses and their alternatives were stated.

   *"The null hypothesis is an hypothesis of "no effect" and is usually formulated for the express purpose of being rejected" (Siegel and Jr., 1988: 7).*

   If the null hypothesis is rejected, then the alternative hypothesis is supported (Siegel and Jr., 1988: 7; De Vaus, 1996: 190). The null hypotheses and their related alternatives in this research were stated in chapter 5.

2. In order to test the research hypotheses the researcher should select a suitable test. One of the main criteria of selecting a statistical test is the level of

measurement (Siegel and Jr., 1988: 7). In this research the dependent variable "extent of use of SCS" is of an ordinal level. The other independent composite variables were measured using indexes that are usually considered also of ordinal level (Babbie, 2001: 150). Thus, parametric tests of association might not be valid in this case because they assume interval level measurements. Two nonparametric tests are commonly suggested by researchers to examine the association between variables of ordinal level of measurement, namely Kendall's tau and Spearman's rho (Siegel and Jr., 1988: 7; De Vaus, 1996: 190; Bryman and Cramer, 2001: 179). In general Kendall's tau is preferred over Spearman's rho. Bryman and Cramer thought, 'One possible reason that is sometimes suggested for preferring tau is that it deals better with tied ranks' (2001: 180). Accordingly the researcher selected Kendall's tau test, as it appears the most suitable test of association for this research.

3. As a further check, and in order to elucidate the relevance of the different institutional technical and intra-organizational composite variables in differentiating between the two groups of SPCs, namely those that exhibited conformity in some form (users), and those that exhibited resistance (non-users) to the institutionally induced SCS, the two groups were compared in terms of their mean scores on each of these composite measures. To compare the mean scores of the two groups of users and non-users of SCS, Mann-Whitney test was conducted. The Mann-Whitney test can be used to test whether the difference in medians between two independent groups of observations is statistically significant, and whether the two groups have been selected from the same population (similar). It is usually considered as

*"one of the most powerful of the nonparametric tests, and is a very useful alternative to the parametric t test when the researcher wishes to avoid the t test's assumptions or when the measurement in the research in weaker than interval scaling" (Siegel & Jr., 1988: 128-129).*

Thus, the Mann-Whitney test is more relevant in this case than *t* test given the ordinal level of measurement of the composite variables in this thesis (Bryman & Cramer, 2001; Siegel & Jr., 1988: 129). Results of this test were used to give further support to the findings of hypotheses' testing using Kendall's tau.

4. The next step in testing the research hypotheses, after the selection of suitable statistical tests, is to define the significance level. The significance level refers to the probability that the observed relationship in the sample is due to chance or sampling error. Thus 'the lower the significance level, the more confident we are that our observed association is real' (De Vaus, 1996: 191). Conventionally, it is identified between 0.05 and 0.01. However the significance level is affected by the sample size (De Vaus, 1996: 191; Bryman and Cramer, 2001: 176). With large samples using 0.05 level of significance increases the probability of committing type I error, which is rejecting the null hypothesis of no association while in reality it is true (Stevens, 2002: 4). In contrast using a tougher significance level of 0.01 increases the probability of committing type II error, which means accepting the null hypothesis of no association while in reality it should be rejected. Since with small samples it is often difficult to reach statistical significance, De Vaus suggests that 'As a rule of thumb use 0.05 for small samples and 0.01 or lower for large samples' (1996: 191). Accordingly, and given the small sample size in this research, the researcher selected 0.05 as the level of significance for this research.

5. Having selected suitable statistical tests and a suitable level of significance, Kendall's tau test statistic and the related level of significance was calculated to examine the association between the extent of use of SCS and the eight composite variables, as shown in table (8-1). Results of Mann-Whitney test, which compares the two groups of users and non users of SCS in SPCs in terms of their scores on the different composite variables, are also reported in table (8-2).

**Table (8-1): Results of Kendall's tau test for the association between the institutional, technical, and intra-organizational willingness and capacity factors and the extent of use of SCS**

| Independent composite variables | Extent of use of SCS | |
|---|---|---|
| | Kendall's tau Correlation Coefficient | Sig. (2-tailed)[12] |
| Coercive pressures (sum 4 items) | **0.681**** | 0.000 |
| Competitive pressures (sum 4 items) | 0.121 | 0.394 |
| Perceived legitimacy (sum 3 items) | **0.593**** | 0.000 |
| Perceived self-interest (sum 3 items) | **0.531**** | 0.000 |
| Perceived economic gains (sum 3 items) | 0.268 | 0.058 |
| Cognitive capacity (sum 6 items) | **0.686**** | 0.000 |
| Organizational capacity (sum 6 items) | **0.657**** | 0.000 |
| Task requirements (sum 3 items transformed) | 0.165 | 0.256 |

** Correlation is significant at the 0.01 level (2-tailed).

The next subsections will explore the relationships between each of the eight composite variables and the extent of use of SCS in SPCs, and discuss the results of testing the research hypotheses.

[12] Two tailed test was calculated because the alternative hypotheses were not directional (Siegel & Jr., 1988: 14)

**Table (8-2): Results of Mann-Whitney test[13] of comparing the scores of the two groups of user and non-user SPCs on the institutional, technical and intra-organizational composite variables**

| Composite variables | Mean scores | | Mean ranks | | Mann-Whitney U | Sig. | Z. |
|---|---|---|---|---|---|---|---|
| | Non-Users | Users | Non-users | Users | | | |
| Coercive pressures (sum 4 items) | 10.70 | 23.06 | 10.78 | 28.16 | 5.500 | .000 | -4.93 |
| Competitive pressures (sum 4 items) | 20.70 | 21.31 | 17.80 | 19.38 | 146.000 | .671 | -.450 |
| Perceived legitimacy (sum 3 items) | 8.25 | 16.00 | 11.65 | 27.06 | 23.000 | .000 | -4.40 |
| Perceived self-interest (sum 3 items) | 12.40 | 18.19 | 12.68 | 25.78 | 43.500 | .000 | -3.79 |
| Perceived economic gains (sum 3 items) | 10.35 | 12.94 | 15.85 | 21.81 | 107.000 | .095 | -1.69 |
| Cognitive capacity (sum 6 items) | 14.95 | 31.19 | 10.63 | 28.34 | 2.500 | .000 | -5.02 |
| Organizational capacity (sum 6 items) | 21.15 | 34.13 | 11.20 | 27.63 | 14.000 | .000 | -4.66 |
| Task requirements (sum 3 items transformed) | 580.80 | 664.3 | 17.30 | 20.00 | 136.000 | .459 | -.935 |

N1 = 20 non-users, N2= 16 users (Two tailed Asymptotical significance)

## 8-2: Exploring the relationships between the extent of use of SCS in SPCs and the extra-organizational factors

As noted earlier in the thesis the coexistence of the two main external forces, namely the coercive institutional and the technical competitive pressures, and which of them is more relevant in affecting the change of MA practices, has not been well explored.

Thus, two hypotheses were derived and related the extent of use of SCS in SPCs with the level of external coercive institutional and technical competitive pressures.

[13] Because the number of cases in each group is greater than 10 the Asymptotical, rather than the Exact, significance test was used ( See Siegel & Jr., 1988: 130-132)

### 8-2-1: Test the association between the extent of use of SCS and institutional coercive pressures:

Consistent with the NIS theorists' ideas (DiMaggio and Powell, 1983: 150) and as noted earlier, coercive pressure was used in the context of this research to mean the influence exerted by supervisory authorities on SPCs towards the adoption of SCS. That is the influence of general organizations or any other public entities upon which SPCs are dependent and work under their supervisions.

The first null hypothesis in this thesis H1-0 predicts no association between the extent of use of SCS in SPCs and the level of "coercive pressures" exerted by supervisory authorities on those companies to adopt SCS.

Table (8-3) is a cross table showing the relationship between the extent of use of SCS and the level of coercive pressures index.

**Table (8-3): Level of coercive pressures index* USE OF SCS Cross tabulation.**

| Coercive pressures index coded | USE OF SCS | | | |
|---|---|---|---|---|
| | Not in use | | Partially or extensively in use | |
| | Frequency | % | Frequency | % |
| Low Coercive pressure (scores<median) | 17 | 85.0% | 0 | 0% |
| High Coercive pressure (Scores ≥ median ) | 3 | 15.0% | 16 | 100% |
| Total | 20 | 100 % | 16 | 100% |

As can be seen from the table above, the majority of SPCs, which reported non-use of SCS (85%), seem to be under low coercive pressures from the supervisory authorities upon which they are dependent.

In contrast all those companies, which reported a usage of SCS in some form, seem to be under high pressure from supervisory authorities to use SCS. Coercion does not mean only the enforcement but is also used in this research to mean the

support provided and the seriousness shown by supervisory authorities in introducing SCS into their subordinate companies. A scrutiny of table (8-2) indicates that the group of SPC users of SCS have received a higher mean score on the composite variable "coercive pressures" (23.06) compared to non-user companies (10.7).

It seems, therefore, that when the level of coercive pressures is high, companies tend to show more conformity.

Corresponding with the results shown in the cross table (8-3), results of Kendall's tau reported in table (8-1) indicate that there is a high positive relationship between the extent of use of SCS in SPCs and the level of coercive pressures exerted on them (T = 0.681). The significance level (P = .000) indicates that there is less than a 0.01 chance that the observed relationship in the selected sample is due to sampling error, which implies rejection of the null hypothesis H1-0. Results of Mann-Whitney tests reported in table (8-2) support this finding (U = 5.500, P < 0.01), suggesting that the mean score of the group of SPC users on this construct is significantly different from the mean score of the non-user group.

It can be concluded therefore, that a high significant positive relationship was found in this research between the extent of use of SCS in SPCs and the level of coercive pressures exerted on them by supervisory authorities upon which they are dependent. Certainly this finding would provide a strong support to the NIS theorists' claim that organizations tend to show more conformity in response to high coercive pressures, (DiMaggio and Powell, 1983: 150; Oliver, 1991: 168) and validates the prediction of resistant behaviour by organizations as a consequence of low coercion (Oliver, 1991: 168). This finding is also consistent with the results

shown by other research where conformance with environmental demands is positively related to coercive pressures (Clemens and Douglas, 2006: 487).

### 8-2-2: Test the association between the extent of use of SCS and the level of technical pressures of competitive environment:

The second external variable measured in this thesis is the technical "competitive pressures". The null hypothesis H2-0, which related this variable with the extent of use of SCS in SPCs, predicted no association between the two variables.

Table (8-4) is a cross table, which illustrates the relationship between the extent of use of SCS and the level of technical "competitive pressures" index in SPCs.

**Table (8-4): competitive pressures index * USE OF SCS Cross tabulation.**

| Competitive pressures index coded | USE OF SCS | | | | Total | |
|---|---|---|---|---|---|---|
| | Not in use | | Partially or extensively in use | | | |
| | Frequency | % | Frequency | % | Frequency | % |
| Low competitive pressure (scores< median) | 8 | 40% | 5 | 31.2% | 13 | 36.1% |
| High competitive pressure (Scores ≥median) | 12 | 60% | 11 | 68.8% | 23 | 63.9% |
| Total | 20 | 100 % | 16 | 100 | 36 | 100% |

It can be seen from the table (8-4) that the majority of SPCs, which do not use SCS (60%) and those that did use the system in some form (68.8%) are subject to high competitive pressures. The finding that (63.9%) of all SPCs in the sample seem to be subject to high competitive pressures, might give support to the claim of some Syrian authors that the environments where SPCs operate are actually competitive (Abdel Nour, 1999: 5; Al-Zaim, 2004: 7).

The figures, however, imply little difference between the user and non-user SPCs in terms of the level of competitive pressures they are facing, indicating probably

little impact of the competitive pressures on the extent of use of SCS. Similarly, a little difference can be detected between the mean scores received on this construct by the two groups of user (21.3) and non-user (20.7) companies (See table 8-2).

Results of Kendall's tau test of association between the extent of use of SCS and the composite variable "competitive pressures" presented in table (8-1) show a very low positive relationship between the two variables (T = 0.121). Level of significance associated with the Kendall's tau test statistic indicates, however, that this relationship is insignificant (P = 0.394), which in turn means that the null hypothesis of no association between the extent of use of SCS and the level of technical "competitive pressures" cannot be rejected. This finding was further supported by the results of Mann-Whitney test shown in table (8-2), which indicate no significant difference (U = 146, P = 0.671) between the SPC users and non-users of SCS in terms of the scores they received on this construct.

It can be concluded, therefore, that no significant relationship between the level of "competitive pressures" and the extent of use of SCS in SPCs was found in the data collected in this research. Competitive pressures of the technical environment seem irrelevant in affecting the conformity or resistance of SPCs to adopt the institutionally induced SCS.

This is actually an interesting finding, which might give support to Modell's claim that in the field of cost allocation practices 'Increasing market competition does not seem to outweigh the institutional demands associated with coercively imposed cost allocation practices' (2002: 670). It might be that the managers in some of the public companies did not realize, or did not care, about the importance of adopting innovative MA practices to combat the conditions of the competitive

environment. It might be also that some SPCs did not have sufficient capability or willingness to cope with the changes in the technical environment. This was supported, as will be seen later, by the fact that most of the non-users of SCS in SPCs seem to have little intra-organizational capabilities to use the system in terms of the availability of good management and the other managerial and cognitive capabilities.

It should be noted that the signs of the correlation coefficients of the two external environment variables (coercive and competitive pressures) are positive, which is consistent with what the institutional and contingency theories suggest (Drury and Tayles, 2000: 31; Major & Hopper, 2003: 25- 26; Oliver, 1991: 171; Tsamenyi et al, 2006: 410), namely conformity is the likely response to both high coercive and high competitive pressures. However, although companies might be subject to both institutional coercive and technical competitive pressures (Chenhall, 2003: 139; Scott and Mayer cited in Powell and DiMaggio 1991: 123; Tsamenyi et al, 2006: 410); the findings in SPCs propose that "coercive pressures" is a more powerful predicator than "competitive pressures" in differentiating between the two kinds of resisting and conforming behaviours in SPCs context.

## 8-3: Explore the relationships between the extent of use of SCS and the intra-organizational willingness factors:

There are different motives behind compliance with the demands of the external environment. MA researchers realized that organizations may use accounting information not only for the purpose of helping decision making and maximizing profits, but also for symbolic, legitimating and attaining self interest purposes (Drury, 2004: 711-715). As mentioned earlier in this thesis, the researcher

considered three main motives that have been stressed by both institutional and contingency theories as incentives for organizational change. Hypothetical relationships between the extent of use of SCS in SPCs and these motives were identified and tested as discussed in the following subsections.

### 8-3-1 Test the association between the extent of use of SCS in SPCs and the level of perceived legitimacy:

Willingness to attain legitimacy in the eyes of pressuring external actors was considered one of the main incentives of the organizational change in the institutional theory literature (Meyer and Rowan, 1977: 348; DiMaggio and Powell, 1983: 148; Zucker, 1987: 443, Oliver, 1991: 161, 1997: 100; Westphal et al, 1997: 367). Thus the third hypothesis H3-1 (see chapter 5) in this thesis predicted an association between the extent of use of SCS in SPCs and the level of perceived legitimacy while the null hypothesis H3-0 predicted no association between the two variables.

Table (8-5) is a cross table that illustrates the relationship between the extent of use of SCS and the level of perceived legitimacy index in SPCs.

**Table (8-5): perceived legitimacy index * USE OF SCS Cross tabulation.**

| Perceived legitimacy index coded | USE OF SCS | | | |
|---|---|---|---|---|
| | Not in use | | Partially or extensively in use | |
| | Frequency | % | Frequency | % |
| Low perceived legitimacy (Scores < median) | 16 | 80.0% | 1 | 6.3% |
| High perceived legitimacy (Scores ≥ median) | 4 | 20.0% | 15 | 93.8% |
| Total | 20 | 100 % | 16 | 100% |

A scrutiny of the table (8-5) shows that the majority of non-user SPCs seems to perceive little legitimacy from adopting SCS (80%) while most of those companies that reported usage of SCS appear to perceive high legitimacy from adopting the system (93.8%).

Similarly, table (8-2) shows that the group of SCS users received a higher mean score on the construct "perceived legitimacy" (16) compared to the group of non-users (8.25).

It seems that perceiving high legitimacy from conforming to an institutional demand for the use of SCS in SPCs was an important incentive for SPCs to adopt SCS. This is actually consistent with the fact that all user companies seem to be under high coercive pressures, which makes legitimating behavior and satisfying the pressuring constituents, one of the important motives behind the conformity to institutionally induced SCS (Westphal et al, 1997: 368).

Results of Kendall's tau test presented in table (8-1) support this finding. The table shows a modest positive relationship between the extent of use of SCS in SPCs and the level of "perceived legitimacy" ($T = 0.593$). Level of significance ($P < 0.01$) associated with the value of tau test statistic means rejection of the null hypothesis H3-0. This finding was further supported by the results of Mann-Whitney test shown in table (8-2), which detected a significant difference in the scores received by the two groups of user and non-user SPCs on this composite variable ($U = 23$, $P < 0.01$).

It can be concluded therefore, that a positive significant relationship was found between the extent of use of SCS in SPCs (hence the extent of conformity) and the level of perceived legitimacy. The impetus of SPCs to secure legitimacy in the

eyes of supervisory authorities is associated with high conformity to the institutionally induced SCS.

This finding gives empirical evidence for the beliefs of some MA researchers that accounting information may be used for legitimating purposes (Drury, 2004: 713); and supports strongly the institutional theorists' ideas that the organizational change is more driven by the need to maintain legitimating appearance (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Zucker, 1987). It also supports Oliver's prediction of more resistance in response to low perceived legitimacy (1991: 160-161), and corresponds with other research, which reported similar findings (Ingram & Simons, 1995: 1479).

**8-3-2: Test the association between the extent of use of SCS in SPCs and the level of perceived self-interest:**

Self-interested behaviour of internal actors, which conflicts with institutional objectives, is expected to limit the responsiveness of organizations to institutional pressures (Oliver, 1991: 159). If internal actors perceived little self-interest from compliance with institutionally induced MA practices they would probably exhibit more resistance to such practices.

MA literature stressed the need to consider the behavioural effects of management control systems on internal actors, who were considered as self-interest driven (Drury, 1996: 639; Horngren and Sundem, 1990: 216; Watts, 1993: 605).

Thus the fourth hypothesis in this thesis H4-1 predicted a relationship between the extent of use of SCS in SPCs and the "perceived self-interest" of the internal actors in SPCs from conformity to institutionally induced SCS rules. The null

hypothesis H4-0 predicts no association between this composite variable and the extent of use of SCS in SPCs.

Table (8-6) is a cross-table, which clarifies the relationship between the extent of use of SCS and the level of perceived self-interest index in SPCs.

**Table (8-6): perceived self-interest index * USE OF SCS Cross tabulation.**

| Perceived self-interest index coded | USE OF SCS | | | |
|---|---|---|---|---|
| | Not in use | | Partially or extensively in use | |
| | Frequency | % | Frequency | % |
| **Low perceived self-interest (scores<median)** | **16** | **80.0%** | 2 | 12.5% |
| **High perceived self-interest (scores ≥ median)** | 4 | 20.0% | **14** | **87.5%** |
| **Total** | 20 | 100 % | 16 | 100 % |

The table portrays considerable difference between user and non-user SPCs concerning the level of self-interest they perceived from adopting SCS. The majority of those companies, which exhibited usage of SCS in some form, seem to perceive high self-interest from adopting SCS (87.5%). There is a lack of such incentives for non-users, however, where (80%) perceived low level of self-interest. This might be driven by a lack of personal financial benefits perceived attainable by internal actors or the existence of the fear of holding responsibility (see the items embodied in this index shown in table 7-19). Table (8-2) gives similar impressions as SPC users of SCS received a higher mean score on this construct (18.19) compared to non-user companies (12.4).

It seems, therefore, that the lack of self-interest has had an impact on the extent of use of SCS in SPCs. Results of Kendall's tau test presented in table (8-1) revealed a positive relationship (T = 0.531) between the extent of use of SCS and the

composite perceived self-interest. The level of significance ($P < 0.01$) implies rejection of the null hypothesis H4-0 of no association between the two variables. Results of Mann-Whitney test presented in table (8-2) give another support to this finding and a significant difference was detected between the scores received by the two groups of SPCs on the composite variable "perceived self-interest" ($U = 43.500$, $P < 0.01$).

It can be concluded, therefore, that in the context of SPCs a significant positive relationship was found between the extent of use of SCS and the level of self-interest perceived attainable by internal actors in those companies.

This finding again supports Oliver's claim that political self-interest among organizational actors that are at cross-purposes with the institutional objectives limit the willingness of organizations to conform to the institutional requirements (1991: 159). Thus when internal actors are personally motivated and perceive high self-interest from adopting institutionally induced MA practices it is more likely that they will positively responding by adopting such practices (Drury, 2004: 714). By contrast, internal actors who are ill motivated and perceive little self-interest from conforming to institutional demands are more likely to show resistance to such demands. The finding also corresponds with the literature of management control systems, which suggests that lack of motivation would cause resistance to such systems by internal actors at different levels of management (Horngren and Sundem, 1990: 216; Watts, 1993: 605). Additionally, it might support Burns and Scapens claims that 'competing interests' is one of the main reasons of resisting MA change (2000: 17).

### 8-3-3 Test the association between the extent of use of SCS in SPCs and the level of perceived economic gain:

Striving for attaining economic gains and high efficiency was considered a main motive of organizational change in contingency theory (Chenhall, 2003: 159; Drury, 2004: 696; Roggenkamp, White and Bazzaoli, 2005). Thus the fifth hypothesis H5-1 predicted an association between the extent of use of SCS in SPCs and the level of perceived economic gains by internal actors in those companies.

Table (8-7) is a cross-table, which clarifies the relationship between the extent of use of SCS and the level of perceived economic gains by internal actors in SPCs.

**Table (8-7): perceived economic gains index * USE OF SCS Cross tabulation**

| Perceived economic gains index coded | USE OF SCS | | | |
|---|---|---|---|---|
| | Not in use | | Partially or extensively in use | |
| | Frequency | % | Frequency | % |
| Low perceived economic gains (scores<median) | 10 | 50.0% | 7 | 43.8% |
| High perceived economic gains (scores ≥median) | 10 | 50.0% | 9 | 56.2% |
| Total | 20 | 100 % | 16 | 100% |

It can be seen from table (8-7) that little difference can be detected between user and non-user SPCs in terms of the economic gains they perceived from using SCS. It seems, however, that the majority of user companies (56.2%) considered attaining economic gains and improving efficiency as one of their incentives to use SCS, although the remainder of the users seem to have other incentives rather than improving efficiency. Likewise, table (8-2) shows that SPCs that reported use of SCS have received a mean score on the construct "perceived economic gains"

(12.94) a slightly higher than the mean score of the companies that reported non-use (10.35).

It appears, therefore, that this factor did not have so much impact on the responsiveness of SPCs to the institutionally induced SCS.

Results of Kendall's tau statistic shown in table (8-1) reveal a low positive relationship between the extent of use of SCS and the composite "perceived economic gains" (T = 0.268). The level of significance associated with this value indicates that the null hypothesis H5-0 cannot be rejected (P = 0.058 > 0.05). Results of Mann-Whitney test presented in table (8-2) show also insignificant difference in the scores received by the two groups of users and non users on this variable (U = 10 7, P = 0.095), which in turn supports further the results of Kendall's tau reported above.

It can be concluded that no significant relationship was found in this research between the extent of use of SCS in SPCs and the level of perceived economic gains. This finding might validate the claim of early institutional theorists that seeking legitimacy, rather than attaining efficiency that affects organizational change (Meyer and Rowan, 1977: 348; DiMaggio and Powell, 1983: 148). However, the P value, which is quite close to the conventional level of significance (0.05) and the positive sign of the correlation coefficient of this variable, might give some support to the claims of some MA theorists that, organizations might have the two types of motivation (Chenhall, 2003: 159, Drury, 2004) and that seeking legitimacy does not necessary conflict with achieving economic efficiency (Modell, 2001, 2002: 655; Carruthers, 1995: 318).

Given that the introduction of SCS into SPCs context was institutionally driven, the findings that SPCs seem to place more emphasis on legitimacy than enhancing efficiency, might lend more support to the claims of some institutional theory researchers that, when the adoption of some organizational practices 'is more driven by conformity pressures rather than technical exigencies, firms may realize legitimacy benefits rather than technical performance benefits from adoption' (Westphal et al, 1997: 368).

## 8-4: Explore the relationships between the extent of use of SCS in SPCs and the intra-organizational capacity factors:

In order to respond to external demands organizations should have the capability to conform. Three hypotheses were developed, relying on the literature, and relating the extent of use of SCS in SPCs to three sub-dimensions of organizational capacity, which will be tested in the following subsections.

### 8-4-1 Test the association between the extent of use of SCS in SPCs and the level of cognitive capacity (awareness):

Conformity with institutionally induced organizational practices might be conditioned by the acquisition of sufficient knowledge and awareness about the imposed practices. The null hypothesis related to the composite "cognitive capacity" H6-0 predicts no association between this variable and the extent of use of SCS in SPCs.

Table (8-8) is a cross table, which clarifies the relationship between the construct "cognitive capacity" and the extent of use of SCS.

A glance to the table (8-8) shows that all user companies seem to have high cognitive capacity. In contrast most of the SPCs that reported non-use of SCS seem to have low cognitive capabilities (85%). Similarly table (8-2) indicates that the group of SPC users received a very much higher mean score on the construct "cognitive capacity" (31.19) compared to the group of non-users (14.95). Clearly, therefore, there is a great difference between the SPC users and non-users of SCS in terms of their awareness and level of knowledge they acquired about the system, which might have an association with the extent of use of SCS in those companies.

**Table (8-8): cognitive capacity index coded 6 items * USE OF SCS Cross tabulation.**

| Cognitive capacity index coded | USE OF SCS | | | |
|---|---|---|---|---|
| | Not in use | | Partially or extensively in use | |
| | Frequency | % | Frequency | % |
| Low cognitive capacity (Scores <median) | 17 | 85% | 0 | 0 % |
| High cognitive capacity (scores ≥median) | 3 | 15% | 16 | 100% |
| Total | 20 | 100% | 16 | 100 % |

Results of Kendall's tau test presented in table (8-1) show a high positive relationship between the extent of use of SCS in SPCs and this composite variable (T= 0.686). The level of significance associated with the test statistic value (P < 0.01) implies rejection of the null hypothesis H6-0. This finding was further supported by the result of Mann-Whitney test shown in table (8-2), which indicates a significant (U = 2.5, P < 0.01) difference in the scores received by the two groups of SPCs on this construct.

One can conclude that a high significant positive relationship was found in this research between the extent of use of SCS in SPCs and the level of cognitive

capacity of internal actors in those companies. This finding again might support Oliver's claim that, among other factors, 'lack of recognition or awareness of institutional expectations limit[s] the ability of organizations to conform to institutional requirements' (1991: 159).

It seems to support also the ideas of some MA researchers who stressed the need of knowledge and training to avoid the unsuccessful implementations of management control systems (Drury, 1996: 635-636) and that the level of knowledge acquired might affect the change and the adoption of innovative MA practices (Burns and Scapens, 2000: 17; Major and Hooper, 2005: 226; Sulaiman et al, 2004: 505). It additionally corresponds with the historical evidence cited in the SCS literature in other countries such as UK, where the failure of early attempts to use SCS in some UK industries was related to insufficient management training in the use and benefits of SCS (Edwards et al, 2002: 33).

**8-4-2 Test the association between the extent of use of SCS in SPCs and the level of organizational capacity (managerial capacity and resource availability):**

In order to respond to external demand companies should have sufficient resources and efficient managerial and organizational capabilities.

Several researchers have referred to the fact that, lack of managerial capabilities; lack of top management support and management inertia would confine the change in MA practices (Edwards et al 2002: 31; Fry et al, 1998: 511; Waweru et al, 2004: 690).

Thus the hypothesis (H7-1) predicted an association between the extent of use of SCS and the level of organizational capacity of SPCs. While the null hypothesis (H7-0) predicted no association between these tow variables.

Table (8-9) presents a cross tabulation for the variables extent of use of SCS and the organizational and managerial capacity index.

**Table (8-9) organizational capacity index coded 6 items * USE OF SCS Cross tabulation**

| Organizational capacity index coded | USE OF SCS | | | |
|---|---|---|---|---|
| | Not in use | | Partially or extensively in use | |
| | Frequency | % | Frequency | % |
| Low organizational capacity (scores< median) | 16 | 80.0% | 1 | 6.2% |
| High organizational capacity (scores ≥ median) | 4 | 20.0% | 15 | 93.8% |
| Total | 20 | 100 % | 16 | 100 % |

Table (8-9) shows that, almost all SPCs that use SCS seem to have high organizational capacity (93.8), while the majority of those which don't use the system have low organizational and managerial capabilities (80%). It can be seen also from table (8-2) that users of SCS in SPCs have higher mean scores on this construct (34.13) compared to non-users of SCS (21.15). This considerable difference between users and non-users in terms of their organizational capabilities entails a possible relationship between this factor and the extent of use of SCS in SPCs.

Results of Kendall's tau test shown in table (8-1) demonstrate a high positive relationship between the extent of use of SCS and the level of organizational capacity of SPCs ($T = 0.657$). The level of significance associated with Kendall's tau value ($P < 0.01$) implies that the relationship between these two variables is

highly significant, which in turn means rejection of the null hypothesis H7-0. Results of Mann-Whitney test shown in table (8-2) support this finding, and a significant difference between the scores received by the two groups of user and non-user SPCs on this construct was detected ($U = 14$, $P < 0.01$).

It can be concluded, therefore, that a high positive significant relationship was found in the data collected in this research between the extent of use of SCS and the level of organizational capacity (in terms of managerial capabilities and the availability of other resources) in SPCs. This finding is consistent with the existing literature in MA, which suggests that the adoption of some MA systems seems to be associated with some organizational factors and the availability of good managerial capabilities (Brown, Booth and Giacobbe, 2004: 349; Batty, 1970: 49; Puxty and Lyall 1989: 34; Kaplan & Cooper, 1998: 38; Hirsch, 2000: 348).

**8-4-2 Test the association between the extent of use of SCS in SPCs and the level of suitability of technological task requirements:**

As noted earlier certain manufacturing traits have been considered by MA scholars as lending themselves to the use of SCS. Thus the last hypothesis in this thesis (H8-1) predicted an association between the extent of use of SCS and the suitability of the technological task characteristics in SPCs to the use of SCS.

Table (8-10) clarifies the relationship between the extent of use of SCS and the construct suitability of technological "task requirement" in SPCs.

**Table (8-10): "task requirements" index * USE OF SCS Cross tabulation**

| Task requirements index coded | USE OF SCS | | | |
|---|---|---|---|---|
| | Not in use | | Partially or extensively in use | |
| | Frequency | % | Frequency | % |
| Low suitability of task requirements (scores < median) | 8 | 40.0% | 4 | 25.0% |
| High suitability of task requirements (scores ≥ median) | 12 | 60.0% | 12 | 75.0% |
| Total | 20 | 100 % | 16 | 100 % |

As can be seen from table (8-10) the majority of SPCs which reported non use (60%) and those that reported some use of SCS (75%) considered their technological characteristics as highly suitable for the use of SCS.

This is consistent with the fact that all the participant companies were manufacturing firms and thus supports the claims of some of MA scholars that SCS is most suitable for manufacturing firms (Drury, 2004, Kaplan and Cooper, 1998).

It can be seen, however, that some difference did exist between respondents in user and non-user companies in terms of how suitable the technological characteristics in their companies are to the use of SCS. The user companies seem to consider their technological characteristics more suitable to the use of SCS compared to non-users. This can be further detected from table (8-2), where user companies received a slightly higher mean score (664.31) on this construct compared to the group of non-users (580.8). This in turn might suggest a possible association between the two variables.

Results of Kendall's tau test presented in table (8-1) reported a weak positive relationship between the extent of use of SCS and the level of suitability of task requirements (T = 0.165). This relationship, however was insignificant (P =

0.256), which again means that the null hypothesis of no association between the two variables cannot be rejected. Results of Mann-Whitney test reported in table (8-2) support this finding, as no significant difference was detected (U = 136, P = 0.459) between the scores of the two groups of users and non-users of SCS on this composite variable.

It can be concluded therefore that no significant association was found in this research between the extent of use of SCS in SPCs and the level of suitability of technological task requirements.

This finding is consistent with previous research in other developed countries. Fry et al, for example, tried to explore the impact of manufacturing environment on the use of SCS in some US companies. The researchers found no significant difference between the users and non-users of SCS in respect of some manufacturing environment characteristics, which led them to conclude that 'many companies may be using the system in an environment that is not suited for such use' (Fry et al, 1998: 509). The last conclusion however seems different from the evidence found in this research, in that the majority of non-users in the public manufacturing sector in this less developed country (60%) do not use SCS in an environment, which is suited to this use. This mismatch might be related to the other factors explored in this research.

Finally, it should be noted that the values of Kendall's tau correlation coefficients of the variables "cognitive capacity" and "Coercive pressure" shown in table (8-1), (0.686 and 0.681 respectively), are the highest among other variables, suggesting that these two conditions might be the most important predictors of conformity in SPCs.

## 8-5 Summary of Chapter 8:

This chapter has explored the relationships between the different institutional, technical, and other intra-organizational willingness and capacity factors and the extent of use of SCS in SPCs.

The results of Kendall's tau test shown in this chapter indicated that the extent of use of SCS in SPCs is found to be positively and significantly ($P < 0.01$) associated with the level of coercive pressures, the level of cognitive capacity, the level of organizational capacity, the willingness to attain legitimacy and the willingness to attain self-interest factors. Results of Mann-Whitney test, which compared the two groups of SPCs that reported use of SCS in some form and those that reported non-use, supported the findings of Kendall's tau test and significant differences between the scores received by the respondents in these two groups on the above mentioned variables were also detected ($P < 0.01$).

Results of both Kendall's tau and Mann-Whitney tests detected no significant relationship ($P = 0.394, 0.671$ respectively) between the extent of use of SCS in SPCs and the level of competitive pressures they are facing, despite the evidence that the majority (63.9%) of SPCs in the cluster sample seem to be under high competitive pressures. This might support the claims of some MA researchers that in such contexts, where institutional pressure is coercively imposed, the impact of the institutional environment seems to outweigh the technical environment (Modell, 2002: 670). Thus the results in SPCs context found in this research suggest that, although companies might be subject to both coercive institutional and technical competitive pressures, the conformity of SPCs to the environmental demands seems to be associated with coercive rather than competitive pressures.

There is also sufficient evidence to support the idea that both institutional and intra-organizational willingness and capacity factors are likely to affect the responsiveness of organizations to their environment pressures, as suggested by some institutionalists (Oliver, 1991) and MA researchers (Modell, 2002; Major and Hopper: 2005).

Additionally some evidence was found in this research that organizations might have different motives for using MA information (Drury, 2004), and that attaining legitimacy does not necessarily conflict with attaining economic gains (DiMaggio and Powell, 1983: 147), although the association between the extent of use of SCS and the composite variable "perceived economic gains", as the results of Kendall's tau test indicated, did not reach the conventional level of significance ($P = 0.058 > 0.05$). SPCs, however, seem to place more emphasis on using SCS for legitimating purposes rather economic purposes.

Insignificant relationship was detected in this research between the extent of use of SCS and the suitability of technological "task requirements" variable, as the results of Kendall's tau and Mann-Whitney tests suggest ($P = 0.256$, 0.459 respectively), despite the fact that the majority of non-user SPCs in this sample considered their technological task environment seem suitable for the use of SCS (60%). Thus, contrary to Fry et al's (1998) finding that US companies did continue to use SCS in an unsuitable environment, the evidence in Syria, as a less developed country, revealed that the majority of SPCs did not use SCS in an environment, which seems suitable to its use. This might be due to some of the other factors explored in this research.

Finally the findings in this research demonstrate that institutional "coercive pressures" is highly significantly associated with the extent of use of SCS in SPCs, which might give strong support to the NIS theorists' ideas. However, other intra-organizational factors were also found to be equally important. Results of hypothesis testing using Kendall's tau statistic suggest that the coercive pressure and the level of cognitive capacity might be the most important predictors for the use of SCS in SPCs, because they are the variables with the highest correlation coefficients (0.681 and 0.686 respectively).

This in turn gives support to the new stream in institutional theory and MA research, which criticizes the deterministic way in which NIS portrays the change in MA practices and urges the need to explore how other intra-organizational factors might combine with institutional factors in affecting the conformity of organizations to the institutional expectations (Zucker, 1987: 450; Oliver 1991: 147; Kraatz & Zajac, 1996; Burns & Scapens, 2000: 5; Modell, 2002, Chenhall, 2003; Major and Hopper, 2005).

The next chapter in this thesis will use the QCA and fuzzy set techniques to explore how the most relevant institutional and other intra-organizational willingness and capacity factors (significantly associated with the extent of use of SCS) were combined together in affecting the use of SCS in SPCs.

# Chapter (9): Exploring the combinatorial effect of institutional and intra-organizational factors on the extent of use of SCS in SPCs: the application of (QCA) analysis

## 9-1 Introduction:

Having tested the main research hypotheses and identified the most important variables, which appeared to be relevant in explaining the differences in the responsiveness of SPCs to the institutionally induced SCS, this chapter proceeds by exploring the patterns of relationships between the most relevant factors. It aims, therefore, to achieve the third objective of this thesis, namely to explore the interplay between the most relevant institutional and intra-organizational willingness and capacity factors, and how they combined together, and in what ways, in affecting the conformity or resistance of SPCs to the adoption of SCS. The aim of this investigation is to gain better insights into the collected data, and to attend to the complexity of MA change (Granlund, 2001), and provide implications for the NIS perspective in MA. Thus, this chapter addresses a core argument raised by some authors, who adopted the NIS approach, concerning the need to consider the interplay between the institutional factors, informed by the NIS, and the other intra-organizational contingencies in affecting the organizational behaviour in general, (Clemens and Douglas, 2005; Ingram and Simons, 1995; Kraatz & Zajac 1996; Oliver, 1991) and the change in MA practices in particular (Carruthers, 1995; Malmi, 1999, Modell, 2002: 654; Tsamenyi et *al*, 2006: 429).

To fulfil the last objective of the thesis, the researcher adopted the QCA, an emerging approach, which has been credited for its usefulness in exploring

patterns of complex relationships in small to moderate size data sets (Ragin, 1994: 105; Schneider and Wagemann, 2005: 2; 2005: 2; Rihoux and Ragin, 2004: 2; Fiss, 2005: 38; Viebrock, 2004: 27).

QCA differs from most of the conventional quantitative techniques (such as regression), which have been criticized for assuming that 'causal conditions are "independent" variables whose effects on outcome are both linear and additive' (Ragin and Sonnett, 2004: 4); and seek to estimate one path of causality for all cases included in a study (Fiss, 2005: 6). QCA challenges the conventional statistical techniques by assuming that causation is complex, rather than simple, and that there might be more than one constellation of causes capable of producing the outcome in question (Ragin, 2000: 130; Viebrock, 2004: 8). It is, therefore, more suitable to this research, both because complex relationships are addressed in this inquiry, and because the number of cases included in the study is relatively small. Furthermore, the binary nature of the outcome of concern in this research, conformity (use) or resistance (non-use) of SPCs to the institutionally induced SCS, is consistent with the technical requirements of QCA, as will be seen later.

The next section will provide a brief discussion about the technique and its underpinnings, before moving to address the different steps in applying this method to explore the patterns of relationships among the significant factors in this research[14]; fuzzy set analysis will be used then to validate the findings of QCA, before interpreting the results and their implications for the institutional theory in MA.

[14] The selection of the relevant conditions was not based purely on the significance of the correlation of the conditions with the outcome. The non-correlated conditions were also examined from the set-theoretic logic's view point to see if any of them is necessary or sufficient to the outcome. None of the insignificant conditions found to be necessary or sufficient. Thus, even from set-theoretic logic, they were found less relevant (see Appendix C). QCA analysis will, therefore, concentrate on the factors that are significantly correlated with the use of SCS, because they are the most relevant, at least from the perspective of variable oriented research.

## 9-2 The underpinnings of QCA:

QCA and its successor, Fuzzy-Set Qualitative Comparative Analysis, fs/QCA, were developed to help researchers analyse data sets of small to moderate size and to reveal complex causality 'by applying set-theoretic methods to cross-case evidence' (Rihoux and Ragin, 2004: 2).

The main concern of the QCA is to explore patterns of similarities and differences across a moderate number of cases and 'unravel the different causal conditions connected to different outcomes' (Ragin, 1994: 108).

The capacity of analysing complex causation, 'defined as a situation where a given outcome may follow from several different combinations of causal conditions' (Rihoux and Ragin, 2004: 5), represents one of the useful features of QCA (Ragin, 1987: 105). QCA is, therefore, capable of revealing complex causation of the equifinal and conjunctural nature[15] (Schneider and Wagemann, 2003: 7-8; Fiss, 2005: 5). According to Ragin

> *"once the possibility of multiple conjunctural causation is admitted, it is necessary to determine how different conditions fit together -and in how many different combinations- to produce a given outcome" (1987: 26).*

A comparative researcher, therefore, examines whether cases sharing the same condition or combinations of conditions share the same outcome. That is he, in this case, searches for those conditions that are sufficient to produce the outcome under consideration. He might, alternatively, study cases with the same outcome and seek to identify their shared causal conditions. In such a situation he tries to reveal conditions that are necessary to produce the related outcome (Ragin, 2000: 91-92; Rihoux and Ragin, 2004: 2-3).

[15] Conjunctural causation refers to the situation, where several conditions combined to produce an outcome, while equifinality refers to the possibility of different paths to result in the same outcome (Schneider and Wagemann, 2003:7-8; Fiss, 2005:4-5).

These two strategies, which a comparative researcher might adopt, aim to establish explicit connection between a condition or combination of conditions and the outcome in question. If a researcher found that all (or nearly all) the instances of the outcome exhibited the same condition or combination of conditions, he could claim explicit connection between the outcome and this combination of conditions (Rihoux and Ragin, 2004: 3).

The goal of a QCA investigation, therefore, is to establish 'causal links- how different **configurations** [in bold in the original] of causes produce different outcomes across the range of cases included in a study' (Ragin, 1994: 114). This concern with examining configurations, where 'A configuration is a specific combination of attributes that is common to a number of cases' (Ragin, 1994: 115), is one of the main characteristics that distinguishes QCA from quantitative techniques. According to the configurational logic two, or more, cases might have the same score on a relevant variable, yet exhibit different outcomes, depending on their context (the other features of the cases). Thus the idea of viewing cases as configurations means, basically, examining the different combinations of values of relevant variables and each combination is treated as potentially a different sort of case (Ragin, 2000: 72). This line of reasoning conflicts with the logic of most of the conventional statistical methods.

*"Indeed, the logic of conventional variable-oriented social science is explicitly organized around isolating the effect of each causal variable –estimating its effect on some outcome, net of the effects of competing variables" (Ragin, 2000: 64).*

The interest of QCA is, therefore, focused not on the individual variables, but on the combinations of these conditions and how they lead to a specific outcome (Ragin and Sonnett, 2004: 4).

The premise of QCA is based on Boolean algebra, the algebra of logic and sets, which uses algebraic manipulation of logical configurations and the set-theoretic approach (Ragin, 2000: 121; Ragin and Giesel, 2003: 41; Fiss, 2005: 5; Rihoux and Ragin, 2004: 5). At the heart of set-theoretic methods 'lies the idea that relationships between different variables are often best understood in terms of *set membership* [in italics in the original]' (Fiss, 2005: 11).

There are two conditions or states in Boolean algebra: true (or present) and false (or absent). The absence of a condition refers to non-membership of a set and is given the Boolean value (0), while the presence of a condition indicates set membership and is given the Boolean value (1) (Ragin 2000: 121; Ragin and Giesel, 2003: 41).

Thus, in this kind of analysis, all variables, independent and dependent, must be nominal scale measures, coded in the above-mentioned way in order to explore the presence or the absence of conditions under which a certain outcome occurs.

Ragin argues that although the dichotomization procedures 'entail some loss of information, the loss typically is not great' (1987: 86). He further stated that most of the social phenomena are already of nominal scale and that transformation can be used to change variables of interval level of measurement into nominal scale measures based on substantive and theoretical knowledge.

Ragin and Giesel detailed some other basic ideas in the Boolean algebra, which are essential to understand the QCA (2003: 41-46). The following are the main basic Boolean logical processes:

1- In the Boolean logic uppercase letters are used to indicate the presence of conditions and lowercase letters to indicate their absence (Ragin, 1987: 89).

Thus, the term (A) for example indicates the presence of the condition (A), while the term (a) refers to the absence of this condition.

2- In the Boolean logic if **A+C =D** and A=1 and C=1, then D=1. That is 1+1= 1. This idea should not be interpreted or understood in arithmetic terms, but in a logical sense. It means simply that if either the condition A OR the condition C is present then the outcome D will occur (Ragin and Giesel, 2003: 43).

3- Boolean multiplication is also different from the normal arithmetic multiplication. So if the condition A is absent, (has the Boolean value 0), and the condition C is present (has the Boolean value 1) then the Boolean statement (**a. C =D)** does not imply that the result of multiplication will be 0 x 1 = 0. Boolean logical multiplication refers simply to the situation where two or more conditions are combined together to produce the outcome under consideration. Thus in this logic 'multiplication indicates the logic AND' (Ragin, 1987: 92), so, the statement (a. **C = D)** means that the absence of condition A, AND the presence of condition C combined to produce the outcome D. It can be also understood in the set-theoretic logic as indicating the intersection of sets. So the previous statement means that the set of cases, which share the absence of condition A AND the presence of condition C are a subset of cases, which exhibit the presence of outcome D.

4- In Boolean logic if two logical expressions differ in only one condition, all other component conditions being identical, yet yield the same outcome, they would be minimized into a more simplified expression, because the different condition in this case is redundant (Ragin, 1987: 87).

Rihoux and Ragin identified three main phases in applying QCA, namely the construction of a truth table, analyzing / minimizing the truth table, and taking results back to the cases and /or theory to evaluate findings (2004: 10).

The following sections will discuss the application of each of these steps on the data collected in this research, in order to explore the different ways in which the significant institutional and intra-organizational conditions combined together in affecting the use of SCS in SPCs.

## 9-3 The construction of the truth table:

As mentioned earlier the first step in applying QCA is to list the evidence related to the different conditions, which are thought to have a connection with the outcome in question, in the form of a truth table.

It was noted in the last section that the application of QCA requires that conditions and the outcome variable need to be in the form of binary variables. Given that this stage of analysis focuses on the different combinations of conditions that affect the conformity (use of SCS) or resistance (non-use of SCS) of SPCs to the institutionally induced SCS, the outcome variable (use of SCS) is recoded into crisp set. Cases that exhibited conformity, hence a usage of SCS in some form, were considered in the set of the outcome (use of SCS). They were given the Boolean value (1), which indicates the presence of SCS. By contrast cases that displayed resistance to the adoption of SCS (non-users) were considered out of the set of the outcome and they were given the Boolean value (0), indicating the absence of the outcome (non-use of SCS).

To recode quantitative variables into crisp sets, researchers should rely on theoretical and substantive knowledge (Ragin and Giesel, 2003). Some qualitative comparative analysts, however, suggest that, in the absence of substantive and theoretical knowledge, recoding variables into binary forms to meet the requirements of QCA can be made based on sample dependent values such as the median (Fiss, 2005: 35; Rihoux and Ragin, 2004: 10; Watanabe, 2003: 7).

Thus, because of the lack of substantive knowledge, and to avoid any judgemental selection of cut off points, the researcher used median scores to recode the relevant variables into crisp sets. This approach to recode variables, known as distributional approach, is preferred in quantitative research methods (see De Vaus, 2002: 166). According to this approach to recode a variable into a binary form a cut off point that divides the distribution of the variable into approximately two equal groups (the median score or 50% cumulative percentage) should be selected. The advantage of using the median scores is that outliers usually do not affect the median (Hussey and Hussey, 1998: 207; Bryman and Cramer, 2001: 81, Saunders *et al*, 2000: 353); and it is also the most appropriate measure of central tendency of ordinal scale variables (Siegel, 1988: 27).

Thus, the distribution of each composite variable was divided into roughly two equal groups using the median scores. Cases, which have scores on a certain construct that are less than the median score in the sample (approximately 50% cumulative percentage cut off point), tend in general to have a low evaluation of the construct. They were, therefore, coded (0), which means in the Boolean logic an absence of the condition (cases are out of the set of the condition). By contrast cases that received scores greater than or equal to the median score on a certain construct (cut off point) were coded (1), indicating that, in general, they have a

high evaluation of this construct, which signifies in the Boolean logic the presence of the related condition (cases are in the set of the condition).

Table (9-1) summarizes the procedures discussed above and shows the selected cut off points and the given Boolean values for each of the most relevant composite variables. As can be seen from this table, median scores were used to recode each construct. Cases that received original scores on a particular construct that are less than the median scores were given the Boolean value 0, while those that received scores equal to or higher than the median were given the Boolean value 1.

***Table (9-1) median scores of the relevant constructs (cut off points) and the given Boolean values***

| Conditions | Median scores | Score cut off points and the given Boolean values | | | |
|---|---|---|---|---|---|
| | | ≥ median | Boolean Score | < median | Boolean Score |
| **Coercive pressure (I)** | 16 | ≥ 16 | 1 | < 16 | 0 |
| **Cognitive capacity (G)** | 21.5 | ≥ 21.5 | 1 | < 21.5 | 0 |
| **Perceived legitimacy (L)** | 12 | ≥ 12 | 1 | < 12 | 0 |
| **Organizational capacity (M)** | 30.5 | ≥ 30.5 | 1 | < 30.5 | 0 |
| **Perceived self-interest (F)** | 16.5 | ≥ 16.5 | 1 | <16.5 | 0 |

Table (9-2) shows the original scores received by respondents and their corresponding Boolean values.

The "Recode" command in SPSS was used to recode these constructs into new variables. The file was then exported from SPSS into fs/QCA software, by saving it in "Tab separated (*.tsv)" format. The exported data file was then used to perform the subsequent crisp set analysis in fs/QCA software (See Ragin and Giesel, 2003: 6-7).

Another issue to mention here is that the term QCA is used in this thesis to indicate the technique of qualitative comparative analysis, sometimes referred to

as crisp set analysis. The package used to perform this analysis fs/QCA (version 2), incorporates all the features of the previous package QCA and, in addition, fuzzy set analysis logic. Using this package enables the researcher to utilize fuzzy analysis in order to validate the results of crisp analysis as will be discussed later.

***Table (9-2): The cases and their scores and the corresponding Boolean code on each variable***

| Case | Causal conditions | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | I (4 items) | | G (6 items) | | M (6 items) | | L (3 items) | | F (3 items) | |
| | Score | Cod | Score | Cod | Score | Cod | Score | Cod | Score | Cod |
| 1 | 5 | 0 | 26 | 1 | 31 | 1 | 9 | 0 | 21 | 1 |
| 2 | 15 | 0 | 15 | 0 | 16 | 0 | 6 | 0 | 15 | 0 |
| 3 | 11 | 0 | 17 | 0 | 26 | 0 | 18 | 1 | 12 | 0 |
| 4 | 10 | 0 | 17 | 0 | 29 | 0 | 6 | 0 | 16 | 0 |
| 5 | 9 | 0 | 15 | 0 | 22 | 0 | 8 | 0 | 12 | 0 |
| 6 | 8 | 0 | 16 | 0 | 32 | 1 | 6 | 0 | 18 | 1 |
| 7 | 8 | 0 | 11 | 0 | 7 | 0 | 5 | 0 | 8 | 0 |
| 8 | 12 | 0 | 15 | 0 | 25 | 0 | 6 | 0 | 8 | 0 |
| 9 | 12 | 0 | 7 | 0 | 15 | 0 | 6 | 0 | 10 | 0 |
| 10 | 7 | 0 | 9 | 0 | 12 | 0 | 3 | 0 | 11 | 0 |
| 11 | 8 | 0 | 10 | 0 | 23 | 0 | 6 | 0 | 10 | 0 |
| 12 | 9 | 0 | 8 | 0 | 11 | 0 | 6 | 0 | 7 | 0 |
| 13 | 7 | 0 | 17 | 0 | 14 | 0 | 7 | 0 | 6 | 0 |
| 14 | 7 | 0 | 8 | 0 | 22 | 0 | 5 | 0 | 14 | 0 |
| 15 | 16 | 1 | 15 | 0 | 32 | 1 | 10 | 0 | 18 | 1 |
| 16 | 6 | 0 | 16 | 0 | 19 | 0 | 13 | 1 | 3 | 0 |
| 17 | 10 | 0 | 14 | 0 | 16 | 0 | 12 | 1 | 14 | 0 |
| 18 | 20 | 1 | 20 | 0 | 25 | 0 | 16 | 1 | 12 | 0 |
| 19 | 20 | 1 | 22 | 1 | 30 | 0 | 11 | 0 | 15 | 0 |
| 20 | 14 | 0 | 21 | 0 | 16 | 0 | 6 | 0 | 18 | 1 |
| 21 | 25 | 1 | 22 | 1 | 37 | 1 | 18 | 1 | 18 | 1 |
| 22 | 22 | 1 | 30 | 1 | 33 | 1 | 17 | 1 | 16 | 0 |
| 23 | 22 | 1 | 31 | 1 | 32 | 1 | 12 | 1 | 18 | 1 |
| 24 | 24 | 1 | 29 | 1 | 32 | 1 | 13 | 1 | 21 | 1 |
| 25 | 25 | 1 | 34 | 1 | 31 | 1 | 18 | 1 | 18 | 1 |
| 26 | 28 | 1 | 31 | 1 | 33 | 1 | 18 | 1 | 18 | 1 |
| 27 | 28 | 1 | 41 | 1 | 41 | 1 | 18 | 1 | 21 | 1 |
| 28 | 20 | 1 | 28 | 1 | 35 | 1 | 11 | 0 | 18 | 1 |
| 29 | 23 | 1 | 33 | 1 | 38 | 1 | 19 | 1 | 17 | 1 |
| 30 | 22 | 1 | 36 | 1 | 38 | 1 | 13 | 1 | 21 | 1 |
| 31 | 20 | 1 | 30 | 1 | 33 | 1 | 20 | 1 | 21 | 1 |
| 32 | 22 | 1 | 31 | 1 | 33 | 1 | 15 | 1 | 18 | 1 |
| 33 | 24 | 1 | 33 | 1 | 38 | 1 | 18 | 1 | 18 | 1 |
| 34 | 28 | 1 | 36 | 1 | 37 | 1 | 18 | 1 | 18 | 1 |
| 35 | 16 | 1 | 24 | 1 | 32 | 1 | 14 | 1 | 12 | 0 |
| 36 | 20 | 1 | 30 | 1 | 23 | 0 | 14 | 1 | 18 | 1 |

**I**: Set of cases under high coercive pressures

**G**: Set of cases with high cognitive capacity

**M**: Set of cases with high organizational capacity

**L**: Set of cases with high perceived legitimacy

**F**: Set of cases with high perceived self-interest

After coding the variables into the form that suits the Boolean logic used in QCA as shown in table (9-2), the researcher moved to the next step, the reconstruction of the raw data into the form of a truth table.

The idea behind the truth table is that it is necessary to arrange the scores of each case on the different conditions as a configuration. The truth table lists the data recoded into binary form (0s, 1s) in a table, which shows the different combinations of values on the different conditions and how they are linked to the values of the outcome variable.

Each logical combination of values of the relevant conditions is shown as one row in the truth table (Ragin, 2000: 123-125; Ragin and Giesel, 2003: 42; Rihoux and Ragin, 2004: 5). Each row is then assigned a value of 0 or 1 on the outcome variable.

Thus there will be as many rows in the truth table as there are possible logical combinations of the related conditions.

The number of possible logical combinations is dependent on the number of conditions and can be identified using the formula $(2)^k$, where k is the number of conditions (Ragin, 1987: 87; 2000: 127).

Thus, in this research the truth table should show $(2)^5 = 32$ possible logical combinations.

Table (9-3) represents the truth table, produced by crisp set analysis in fs/QCA software, for the data matrix shown in table (9-2) related to the five conditions that are significantly associated with the extent of use of SCS in SPCs.

As can be seen from table (9-3), each set of cases sharing the same combination of conditions and the same Boolean value (0 or 1) on the outcome variable (extent of

use of SCS) is represented as one row in the truth table. The first row for example shows that 12 cases, of the 16 cases of SPCs, which exhibited usage of SCS in some form (have the Boolean value 1 on the outcome variable), shared the same configuration, that is the presence of all causal conditions (all the conditions have the Boolean value 1).

**Table (9-3): truth table for the conditions affecting the use of SCS in SPCs**

| Number of the row | Causal conditions | | | | | Number of cases | Outcome Variable Use of SCS |
|---|---|---|---|---|---|---|---|
| | I | G | M | L | F | | |
| **1** | 1 | 1 | 1 | 1 | 1 | **12** | **1** |
| 2 | 0 | 0 | 0 | 0 | 0 | **11** | **0** |
| 3 | 0 | 0 | 0 | 1 | 0 | 3 | 0 |
| 4 | 1 | 1 | 1 | 1 | 0 | **2** | **1** |
| 5 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 6 | 0 | 0 | 1 | 0 | 1 | 1 | 0 |
| 7 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| 8 | 1 | 0 | 0 | 1 | 0 | 1 | 0 |
| 9 | 1 | 0 | 1 | 0 | 1 | 1 | 0 |
| 10 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
| **11** | 1 | 1 | 0 | 1 | 1 | **1** | **1** |
| **12** | 1 | 1 | 1 | 0 | 1 | **1** | **1** |
| 13 | 0 | 0 | 0 | 1 | 1 | 0 | ? |
| 14 | 0 | 0 | 1 | 0 | 0 | 0 | ? |
| 15 | 0 | 0 | 1 | 1 | 0 | 0 | ? |
| 16 | 0 | 0 | 1 | 1 | 1 | 0 | ? |
| 17 | 0 | 1 | 0 | 0 | 0 | 0 | ? |
| 18 | 0 | 1 | 0 | 0 | 1 | 0 | ? |
| 19 | 0 | 1 | 0 | 1 | 0 | 0 | ? |
| 20 | 0 | 1 | 0 | 1 | 1 | 0 | ? |
| 21 | 0 | 1 | 1 | 0 | 0 | 0 | ? |
| 22 | 0 | 1 | 1 | 1 | 0 | 0 | ? |
| 23 | 0 | 1 | 1 | 1 | 1 | 0 | ? |
| 24 | 1 | 0 | 0 | 0 | 0 | 0 | ? |
| 25 | 1 | 0 | 0 | 0 | 1 | 0 | ? |
| 26 | 1 | 0 | 0 | 1 | 1 | 0 | ? |
| 27 | 1 | 0 | 1 | 0 | 0 | 0 | ? |
| 28 | 1 | 0 | 1 | 1 | 0 | 0 | ? |
| 29 | 1 | 0 | 1 | 1 | 1 | 0 | ? |
| **30** | **1** | **1** | **0** | **0** | **1** | **0** | **?** |
| **31** | 1 | 1 | 0 | 1 | 0 | 0 | ? |
| **32** | 1 | 1 | 1 | 0 | 0 | 0 | ? |

It should be noted that there is no technical reason to show the frequencies of each logical combination of conditions in the truth table. They are, however, mentioned to remind the researcher that each row probably represents more than one case

(Ragin, 1987: 87), although the frequencies of configurations can be used as a benchmark for the inclusion of those important configurations into crisp set analysis in fs/QCA (See Ragin and Giesel, 2003: 56-57).

Table (9-3) presents also all the other logically possible combinations of conditions rather than those observed empirically. Those non-observed possible logical combinations are referred to as remainders and point to the possible combinations that are lacking cases (Ragin, 2000: 131; Ragin and Giesel, 2003: 60). They were marked (?) in the outcome variable column in table (9-3), because, as there is no empirical evidence, the outcomes are not known.

Another important output of crisp set analysis in fs/CQA is a list of the different observed configurations in the truth table using the terms, which were selected to refer to the presence or the absence of the related conditions. Recalling that, in Boolean analysis, uppercase letters indicate the presence of conditions and lowercase letters their absence, the observed configurations in the collected data were represented using the Boolean expressions by selecting the "List" command in fs/QCA, as shown in table (9-4).

**Table (9-4) TRUTH TABLE LISTING, Rows: 12 - Cases: 36**

| Truth table configurations | Outcome (Use SCS) | Number of cases | Percentage |
|---|---|---|---|
| I. G. M. L. F | 1 | 12 | 33.3% |
| I. G. M. l. F. | 1 | 1 | 2.8% |
| I. G. M. L. f. | 1 | 2 | 5.6% |
| I. G. m. L. F. | 1 | 1 | 2.8% |
| i. g. m. l. f | 0 | 11 | 30.6% |
| i. g. m. L. f. | 0 | 3 | 8.3% |
| I. G. m. l. f. | 0 | 1 | 2.8% |
| i. g. m. l. F. | 0 | 1 | 2.8% |
| I. g. m. L. f. | 0 | 1 | 2.8% |
| i. g. M. l. F. | 0 | 1 | 2.8% |
| I. g. M. l. F. | 0 | 1 | 2.8% |
| i. G. M. l. F. | 0 | 1 | 2.8% |
| Total | | 36 | |

As can be seen from the above table the collected data embraces 12 configurations (rows). The first four configurations are connected to the presence of SCS (have the Boolean value 1 on the outcome variable) and represent the 16 cases that reported usage of SCS; of which 12 cases (75% of the user companies and 33.3% off the total cases) shared the same combination of conditions (**I. G. M. L. F**). That is the combinatorial presence of high institutional coercive pressures from supervisory authority (**I**), high cognitive capacity (**G**), high organizational capacity (**M**), high-perceived legitimacy (**L**) and perceiving high self-interest (**F**) from using the technique.

The other 8 configurations are connected with the absence of SCS, which in turn represent the 20 cases that reported non-use of SCS (cases with Boolean value 0 on the outcome variable); of which 11 cases (55% of the non-user companies and 30.6% off total cases) shared the same combination of conditions (**i. g. m. l. f**). That is the combinatorial absence of the five conditions, which are thought to affect the use of SCS.

These two important combinations suggest that the presence of these conditions is connected with the presence of the outcome variable (the use of SCS).

Another feature of the data summarized in table (9-4) is the absence of any contradictory configuration. Contradictory cases are those sharing the same combination of conditions yet yielding different outcomes. This might reflect, therefore, the coherence of the collected data in this research (Rihoux and Ragin, 2004: 8) and probably the sound selection of the relevant conditions (Ragin, 2000: 125).

## 9-4: Minimizing the truth table:

After constructing the truth table, which shows the different configurations linked to different outcomes, the researcher should minimize the truth table in order to obtain more simplified terms. The minimization is based on the Boolean rules for simplifying Boolean expressions. One of these important minimization rules is that:

> *"If two Boolean expressions differ in only one causal condition yet produce the same outcome, then the causal condition that distinguishes the two expressions can be considered irrelevant and can be removed to create a simpler, combined expression" (Ragin and Giesel, 2003: 46).*

Thus, in the Boolean logic if two logical expressions are identical, but differ in only one term and at the same time they produce the same outcome, then this different term is considered irrelevant in producing the outcome and can be eliminated. For example, consider the expressions **(I. G. M. L. F)** and **(I. G. M. L. f)** shown in the first and third rows respectively of the table (9-4). These two observed configurations are identical in all terms, but differ in the fifth condition (the presence of high perceived self-interest, F), yet the two expressions produced the same outcome (the presence of SCS). Thus this condition can be eliminated because, in this set of cases, it did not matter whether organizations perceived high or low self-interest from using SCS. If the other conditions were present the conformity to institutionally induced SCS would still occur and companies would exhibit usage of SCS. Thus the two expressions can be simplified and the resultant expression becomes: Use of SCS = **I. G. M. L.**

This minimization procedure 'uses Quine-McCluskey algorithm, a common algorithm for simplifying set-theoretic statements' (Fiss, 2005: 14), which is incorporated in software packages such as QCA and fs/QCA (Ragin and Giesel, 2003: 52).

Ragin, argues that the logic of Boolean minimization mimics the experimental design logic in that only one condition (F in the above case) varies and no difference in the outcome is detected (1987: 93). The Boolean minimization is performed in bottom-top fashion until no further simplification of the Boolean expressions is possible (Ragin and Giesel, 2003: 46).

In order to minimize the truth table in crisp set analysis, which uses the above-mentioned Boolean logic, the researcher should take into consideration one important issue, which would partly affect the final solution obtained, namely, how to deal with the remainders (non-observed cases) and hence the problem of limited diversity (Ragin, 2000: 139; 2004: 4; Rihoux and Ragin, 2004: 12).

Rihoux and Ragin referred to what they considered good practice in respect of the minimization process in QCA, suggesting that researcher should

> *"Proceed systematically to four minimizations: those for the configurations with a "1" outcome, first without and then with the inclusion of logical cases ("remainders", non-observed cases), and those for the configurations with a "0" outcome, first without and then with the inclusion of logical cases" (2004: 10).*

It should be noted that the final purpose of the analysis is to simplify the truth table and unravel the simplified expressions that explain the change in the outcome variable.

The following subsections will discuss the results of minimizing the truth table according to each of these four possibilities, suggested by Rihoux and Ragin (2004), using crisp set analysis in fs/QCA software.

### 9-4-1: Simplifying the positive configurations related to the use of SCS without considering the remainders:

Crisp analysis in the fs/QCA software allows the minimization of each group of configurations shown in the truth table by selecting which group of cases, (positive (1), negative (0), don't care (-), contradiction, or remainders), is to be included in the analysis. At the first step the researcher sought to minimize the configurations linked to the Boolean value "1" on the outcome variable (positive cases), that is those combinations of conditions connected with the presence of SCS. The analysis was performed firstly without including the remainders (non-observed configurations). This was done by activating the "positive cases (1)" in fs/QCA, while keeping the other options in the "Exclude" position, as a conservative strategy (Rihoux and Ragin, 2004:12).

Table (9-5) shows the results of crisp analysis for the configurations of causal conditions related to SPCs that reported usage of SCS without the inclusion of remainders.

The first part of crisp analysis output shown in table (9-5) provides a summary of the truth table. It can be seen that there are in total 12 configurations in the collected data. Four configurations with the value 1 on the outcome variable representing the 16 cases that exhibited usage of SCS, and 8 configurations connected with the value 0 on the outcome variable representing the 20 cases that reported non-use of SCS. The table also shows no contradictory (C terms) configurations.

**Table (9-5) the results of crisp analysis for the SPCs that reported usage of SCS without the inclusion of remainders**

| Configurations | | % | Cases | % |
|---|---|---|---|---|
| 0 Terms | 8 | 66.7 | 20 | 55.6 |
| 1 Terms | 4 | 33.3 | 16 | 44.4 |
| - Terms | 0 | 0 | 0 | 0 |
| C Terms | 0 | 0 | 0 | 0 |
| 0 | | | 0 | |
| 1 | | | 0 | |
| Total | 12 | 100 | 36 | 100 |

*** CRISP-SET SOLUTION ***

| Expressions | Frequencies | Coverage % |
|---|---|---|
| I*G*M*L+ | 14 | 87.5% |
| I*G*M*F+ | 13 | 81.25% |
| I*G*L*F | 13 | 81.25% |

The lower part of the output presented in table (9-5) shows the crisp solution, which represents the simplified Boolean expressions that explain the usage of SCS in SPCs, and the number and the percentage of the positive cases, which are covered by each expression. This solution can be summarized by the following equation:

$$\mathbf{I.G.M.L + I.G.M.F + I.G.L.F \rightarrow SCS} \qquad \mathbf{(1)}$$

Where, (SCS) is the outcome variable and indicates the presence of standard costing; Multiplication (.) refers to combined conditions (logical operator AND); addition (+) indicates alternate combinations of conditions (logical operator OR); and (→) indicates "is sufficient for" (or is explicitly linked to).

The above equation (1) suggests that there are three different paths or combinations of the conditions, which are explicitly connected with the presence of SCS in SPCs context (conformity of SPCs). Those are the combinatorial

presence of high coercive institutional pressure (I), high cognitive capacity (G), high organizational capabilities (M) and high perceived legitimacy (L); or the combinatorial presence of high coercive institutional pressure (I), high cognitive capacity (G), high organizational capabilities (M) and high perceived self-interest (F); or, finally, the combinatorial presence of high coercive institutional pressure (I), high cognitive capacity (G), high perceived legitimacy (L) and high perceived self-interest(F).

A scrutiny of the bottom part of table (9-5) reveals also that the last two paths (**I.G.M.F** and **I.G.L.F**) are of similar empirical importance because they cover the same percentage of SPCs that exhibited use of SCS (81.25%), while the first path (**I.G.M.L**) seems slightly more important, because it covers a slightly higher percentage of SPCs that use SCS (87.5%). This relative importance of each path is referred to as 'coverage' (Ragin, 2003, 2006; Fiss, 2005: 23). Thus while different paths are all equally able to produce the outcome, they, however, might differ in their empirical importance. The proportion of instances of the outcome that display a given configuration is, therefore, a gauge in measuring its empirical importance (Ragin, 2003, 2006:299).

It can be also seen from the table above that both the high coercive pressure and the high cognitive capacity did exist in all of the three expressions shown in the crisp solution. It can be noted also that the coexistence of these two conditions combined with other conditions related to the availability of high organizational capabilities (in terms of good management and the availability of other organizational resources) or other willingness elements. These observations have some implications for theory and will be discussed later in this chapter.

### 9-4-2: Simplifying the positive configurations related to the use of SCS with the inclusion of remainders:

One of the most challenging aspects of QCA is the problem of limited diversity, where all the logically possible combinations of causal conditions are not covered by empirical evidence (Ragin, 2000: 139; Rihoux and Ragin, 2004:11).

Ragin and Sonnett argue: 'naturally occurring social phenomena are limited in their diversity'. They further noted that such limited diversity makes the analysis of these phenomena rather complicated (2004: 2).

Limited diversity is not limited to small- and moderate –N investigations. Rather, it is the general state for naturally occurring social and political phenomena (Ragin, 2000: 139; Ragin and Sonnett, 2004: 10-11; Rihoux and Ragin, 2004: 11).

Ragin (2003) referred to the fact that most researchers who use QCA and fs/QCA either incorporate as many simplifying assumptions as possible (including as many non-observed cases as possible) or they avoid them altogether. He further insisted that researchers rarely do what they should do, that is evaluate each simplifying assumption to see if it is plausible (Ragin, 2000: 140) and then incorporate only those that are.

The ability to deal with limited diversity represents one of the main advantages of QCA over the conventional techniques (Ragin, 2000: 140; Rihoux and Ragin, 2004: 11). The challenge, however, is how to achieve logical treatment of non-observed cases.

One way to deal with limited diversity is to incorporate only those logically possible and plausible non-observed combinations. Ragin (2003) argues that one solution to the limited diversity problem, which could help researchers in making simplifying assumptions, is by making directional expectations based on theory

and observed cases about the relationships between the causal conditions and the outcome.

Accordingly, the researcher started by examining the observed cases that exhibited usage of SCS. A scrutiny of the observed cases that exhibited the outcome revealed that in all of the four observed configurations related to these cases, the coexistence of high coercive institutional pressures and high cognitive capacity along with the existence of some other elements related to the willingness to use SCS or organizational capability were combined to produce the use of SCS. NIS theory suggests also that the presence of high coercive pressure is connected with conformity of organizations to institutional expectations (DiMaggio and Powell, 1983; Oliver 1993); and lack of knowledge capability would cause resistance to MA change as the literature suggests (Burns and Scapens, 2000: 17). This knowledge of the observed cases and expectations based on theory were used in examining the non-observed cases and choosing those plausible ones for inclusion in the analysis.

It can be seen from the truth table (9-3) that the last three configurations lacking cases embraced the two important terms, presence of high institutional pressure (I) and high cognitive capacity (G) combined with one of the other remaining conditions related to the willingness to use the system or the availability of high organizational capacity. Thus, in comparison with the observed cases that exhibited the outcome, these three combinations seem plausible configurations that might be connected with the presence of SCS.

In crisp analysis an alternate strategy to deal with non-observed cases is to treat the chosen remainders as don't care combinations. This means, 'When treated as a *don't care*, a remainder is available as a potential simplifying assumption' (Rihoux

and Ragin, 2004: 12). That is it will be treated as if it were a case of the outcome if this results in a simpler minimal solution. It also can be treated as a case of the absence of the outcome if this procedure results in a simpler solution for the absence of the outcome.

The inclusion of the last three combinations of non-observed cases shown in the truth table (see table 9-3), as don't care option (- Term) resulted in the following crisp set analysis solution presented in table (9-6).

As can be seen from table (9-6) three configurations were added to the analysis as if they were observed. They were, however, treated as don't care cases (-Terms). That is they were included as simplifying assumptions. The crisp set solution for the positive cases, with the inclusion of the plausible remainders leads to more simplified expressions as shown in table (9-6).

**Table (9-6): The results of crisp analysis of positive configurations related to the use of SCS in SPCs with the inclusion of remainders**

| Configurations | | % | Cases | % |
|---|---|---|---|---|
| 0 Terms | 8 | 53.3% | 20 | 51.3% |
| 1 Terms | 4 | 26.7% | 16 | 41.0% |
| **- Terms** | **3** | 20.0% | 3 | 7.7% |
| C Terms | 0 | 0 | 0 | 0 |
| 0 | | | 0 | |
| 1 | | | 0 | |
| Total | 15 | 100 | 39 | 100 |

*** CRISP-SET SOLUTION ***

| Expressions | Frequencies | coverage % | Exact Sig. (1-tailed)* (P) |
|---|---|---|---|
| **I.G.M+** | 15 | 93.75% | .010 |
| **I.G.L+** | 15 | 93.75% | .010 |
| **I.G.F** | 14 | 87.50% | .045 |

*Results of Binomial Test, test proportion 65%, all combinations are usually sufficient for the use of SCS at 5 % significance level.

The solution shown in the bottom part of the table (9-6) can be summarized in the form of the following equation:

$$\mathbf{I.G.M+ I.G.L+ I.G.F \dashrightarrow SCS} \qquad \mathbf{(2)}$$

Equation (2) can be rewritten using the characteristics of set manipulations as follows:

$$\mathbf{I.G\ (M+L+ F) \dashrightarrow SCS} \qquad \mathbf{(3)}$$

Equation (3) shows three alternate combinations of conditions that are sufficient to produce the use of SCS in SPCs.

Those are the combinatorial presence of both high institutional coercive pressures (I) and high cognitive capacity (G) combined with the presence of either high organization capacity, or high-perceived legitimacy (L) or high-perceived self-interest (F). The crisp solution shows also that the first two paths are of similar empirical importance because they cover 93.75% of the set of SPCs with the Boolean value 1 on the outcome variable (users of SCS), while the third expression is slightly less important, yet it still covers a considerable proportion (87.5%) of SPCs that exhibited conformity (use) to the institutionally induced SCS.[16]

Comparing this solution related to the positive cases with the first one obtained without the inclusion of remainders indicates that including the chosen remainders in the crisp analysis leads to a considerably more parsimonious solution. Furthermore the above solution embraces all the logically possible and plausible configurations that would lead to the presence of SCS and hence the conformity of SPCs to institutional expectations. The expressions in the first solution

[16] These proportions were compared with a benchmark test proportion of 65%, results of Binomial test to compare these proportions were calculated separately and reported in the last column of table (9-6). All the expressions passed the test at 5% significance level.

summarized in equation (1) are also contained in the expressions of the second solution summarized in equations (2) and (3). For example the expression **(I.G.M.L)** is contained in the expression **(I.G.L),** which means that the second expression is a superset of the first one (Ragin and Sonnett, 2004).

Before accepting equation (3) as the final solution for the conditions connected with the presence of SCS, and interpreting the implications of QCA solution for theory in terms of sufficiency and necessity, the researcher decided to use fuzzy set analysis to provide further validation to this solution as will be discussed later.

### 9-4-3: Simplifying the negative configurations related to the non-use of SCS without the inclusion of remainders:

This part of the analysis looks at the different conditions combined in producing the non-use of SCS in SPCs, first, without considering the non-observed configurations. The analysis was performed by adjusting the negative cases into the "True" position in crisp set analysis in fs/QCA software, while all the other options were kept in the "Exclude" position. The analysis resulted in the same truth table summary presented in table (9-4), which portrays the (12) observed configurations. The inclusion of the (8) negative configurations linked to the value (0) on the outcome into crisp set analysis resulted in the following solution presented in table (9-7).

**Table (9-7): CRISP-SET SOLUTION - negative cases**

| Expressions | Frequencies | coverage % |
|---|---|---|
| i. g. m. l+ | 12 | 60% |
| g. m. L. f+ | 4 | 20% |
| i. M. l. F+ | 2 | 10% |
| g. M. l. F+ | 2 | 10% |
| I. G. l.m.f | 1 | 5% |

As the output of crisp set analysis suggests, there are five different paths, which are connected with the absence of SCS in SPCs. Those are the combination of low coercive institutional pressure (i), low cognitive capacity (g), low organizational capabilities (m) and low perceived legitimacy (l); or the combination of low cognitive capacity (g), low organizational capabilities (m), high perceived legitimacy (L) and low perceived self-interest (f); or the combination of low coercive pressure (i), high organizational capabilities (M), low perceived legitimacy (l) and high perceived self-interest (F); or the combination of low cognitive capacity (g), high organizational capabilities (M), low perceived legitimacy (l) and high perceived self-interest (F); or, finally, the combination of high coercive institutional pressure (I), high cognitive capacity (G), low perceived legitimacy (l), low organizational capabilities (m) and low perceived self-interest (f).

The above solution can be rewritten as an equation as follows:

$$\mathbf{i.g.m.l + g.m.L.f + i.M.l.F + g.M.l.F + I.\ G.\ l.m.f \rightarrow \quad scs \quad (4)}$$

While all the above expressions represent different paths that could lead to the absence of SCS in SPCs, the first configuration seems of the most empirical importance because 12 cases of the set of 20 cases that exhibited resistance to use SCS (60%) shared this combination of conditions. It can be seen also that the second configuration is more important than the other three remaining configurations as it covers a relatively larger number of cases (4 cases or 20%) that do not use SCS.

It can be seen from equation (4), also, that all the expressions that were sufficient to produce non-use of SCS are different from those found in the two equations

related to the presence of SCS in SPCs. Moreover, in most of the combinations of conditions that are connected with the absence of SCS both low cognitive capacity and low coercive pressures prevailed. While the last expression showed combinatorial presence of high cognitive capacity and high coercive pressure yet the resistance to adopt SCS would still occur given the lack of sufficient motives for this set of non-users to adopt the system and the lack of sufficient organizational capabilities. This expression, however, covers only one case (5% of the cases) and, empirically, is the least important.

### 9-4-4: Simplifying the negative configurations related to the non-use of SCS with the inclusion of remainders:

The final possibility of simplifying the configurations in the truth table is to include remainders in the analysis of negative cases (with 0 values on outcome).

Again the inclusion of the non-observed cases in this step of the analysis was built on examining the non-observed configurations to see whether they are plausible and including only those are.

A scrutiny of the non-observed configurations in the truth table (9-3) indicates that configurations in the rows 13 to 23 shared a low coercive pressure (have the Boolean value 0 on this condition), while all the configurations from 24 to 29 shared a low cognitive capacity. Comparing these configurations with the other observed cases indicates that they are more likely to be connected with the absence of the outcome, because in all the configurations linked to the presence of SCS the cognitive capacity and the high coercive pressures coexisted and combined with some other elements related to the willingness to use SCS or the availability of high organizational capability.

Thus the researcher decided to include these 17 configurations as don't care option in the analysis of the negative cases. The inclusion of these hypothetical cases in the analysis of the conditions linked to the absence of SCS resulted in the following output shown in table (9-8).

Table (9-8) indicates that 17 configurations with the "don't care (- Term)" value on the outcome variable were included in the simplification of the 8 negative configurations connected with absence of the outcome.

**Table (9-8): The results of crisp analysis of negative configurations related to the non-use of SCS in SPCs with the inclusion of remainders**

| Configurations | | % | Cases | % |
|---|---|---|---|---|
| 0 Terms | 8 | 27.6 | 20 | 37.7 |
| 1 Terms | 4 | 13.8 | 16 | 30.2 |
| **- Terms** | **17** | 58.6 | 17 | 32.1 |
| C Terms | 0 | 0 | 0 | 0 |
| 0 | | | 0 | |
| 1 | | | 0 | |
| Total | 30 | 100 | 53 | 100 |

***** CRISP-SET SOLUTION *****

| Expressions | Frequencies | % coverage | Exact Sig. (1-tailed) |
|---|---|---|---|
| **i. +** | 17 | 85% | .044* |
| **g. +** | 18 | 90% | .012* |
| **l.m.f** | 12 | 60% | |

* Binomial test, test proportion 65%, conditions are usually sufficient at 5% significance level.

This procedure resulted in a very parsimonious crisp solution, which can be rewritten in the form of the following equation:

$$\mathbf{i + g + (l.\ m.\ f) \rightarrow\ scs} \qquad \mathbf{(5)}$$

The minimal solution shown in equation (5) suggests that there are three different paths that are sufficient to produce resistance to the institutionally induced SCS, in SPCs (explicitly connected with the absence of SCS). Those are the low coercive

pressure by itself; or the low cognitive capacity by itself; or the combination of low perceived legitimacy and low organizational capacity and low perceived self-interest. It can be seen that the expressions in the crisp solution presented in table (9-7) and formula 4 are contained in the expressions presented in formula 5. Looking to the coverage of each path it seems that in SPCs the absence of SCS might be more affected by the low cognitive capacity acquired by SPCs about SCS, or the low coercive pressure exerted on this set of companies by supervisory authority upon which they are dependent, because each of these two conditions was sufficient by itself to produce resistance to SCS in high proportions of non-user SPCs (90% and 85% respectively).[17] Although the last path, (**l.m.f.**), appears to be of the least importance among the different paths, it, however, covers (60%) of the cases that don't use SCS.

Again it can be seen that the expressions of equation (4) are subsets of the expressions in equation (5), and the solution shown in formula 5 seems substantially more parsimonious.

It should be noted that it could be possible to deduce the combinations of conditions connected with the absence of SCS in SPCs by applying De Morgan's law on formula (3) that explains the use of SCS in SPCs, as suggested by Ragin and Giesel (2003: 50).

The procedures of applying De Morgan's law on the crisp set solution shown in formula (3), in order to deduce the conditions connected with the absence of SCS in SPCs, can be summarized as follows:

[17] Binomial test was also conducted on these proportions and reported in table (9-8), using 65% as a test proportion. Both (i) and (g) passed the test of sufficiency at 5% significance level.

1- The formula that explains the presence of the outcome (use of SCS) is considered the point of departure. That is formula (3), **I.G.(L+M+F) → SCS.**

2- Elements that are coded present (uppercase letters) in this equation are recoded absent (lowercase letters) and that are coded present are recoded absent.

3- Logical AND is recoded to logical OR and logical OR is recoded to logical AND. (See Ragin and Giesel, 2003: 50).

Applying these procedures on formula (3) resulted in the following equation, **(i+ g + (l.m.f.) → scs)**, which is identical to equation (5) derived from crisp analysis of negative cases with the inclusion of remainders and explains the non-use of SCS in SPCs.

Thus the solution summarized in equation 5 is a candidate to be a final solution for the conditions connected with the absence of SCS in SPCs.

Again, before accepting the solutions of crisp analysis, summarized in equations (3) and (5), as final solutions the researcher used fuzzy set analysis to provide further validation to crisp analysis results. The next section will report fuzzy set analysis results.

## 9-5: Validating QCA results, the application of fuzzy set qualitative comparative analysis fs/QCA:

### 9-5-1: The logic of Fuzzy set analysis:

As noted earlier the data analysis in this research focuses on the different combinations of conditions connected with the conformity or resistance of SPCs to the institutionally induced SCS. Thus QCA might be more appropriate because of the binary nature of the outcome variable (use or non-use of SCS), which suits this

technique. However, the researcher wanted to take account of the potential error in selecting the cut off points, which have been used to code relevant conditions into dichotomies (crisp sets). He wanted also to avoid the deterministic (non-probabilistic) nature of necessity and sufficiency analysis for which crisp analysis has been criticised. It is also intended to provide a source for validating the findings of the crisp set analysis.

An alternative set-theoretic method that avoids the so-called limitations of crisp analysis is fuzzy set analysis.

Fuzzy set analysis extends crisp analysis, 'by permitting membership scores in the interval between 0 and 1' (Ragin and Giesel, 2003: 67). Thus, instead of using crisp logic which assumes only two states for a particular condition, present or absent, fuzzy sets allow several set memberships between the two qualitative states of membership and non-membership (Smithson, 1987: 9).

Fuzzy set logic, which is derived from set theory, assumes that 'a case does not always display completely, or not at all respectively, the criteria of a certain concept' (Viebrock, 2004: 10). That is cases might partly belong to the set of a particular concept or partly do not. Accordingly respondents' scores on a variable can be given fuzzy values between 0 and 1, which indicate the extent to which a case belongs to the set of a certain outcome or condition. The fuzzy value 0 means, in the set-theoretic logic, non-membership and indicates that a case is fully out of the set of a certain condition; the fuzzy value 1 indicates full membership or that a case is fully in a set of a particular condition; the 0.5 score signifies that a case is neither in nor out of a set (state of maximum ambiguity). It is also possible to assign different scores in between to show the extent to which a case belongs to a set (Ragin, 2000: 154; Ragin and Giesel, 2003: 22; Viebrock, 2004: 10). Fuzzy

sets are, therefore, both qualitative and quantitative because they include the two qualitative states of membership and non-membership, and at the same time they show the degree to which cases belong to a set. Thus, they have many of the virtues of interval-scale, but they are also suitable for set operations, which conventional variables are not able to address (Ragin, 2000: 154-155).

The logical operations discussed in crisp analysis are also used in fuzzy set algorithms, but in a different way.

Ragin and Giesel (2003: 67) discussed the meaning of the main logical operations in the fuzzy set. The logical "AND", for example, is performed by taking the minimum fuzzy set membership score of each case in the sets that are intersected. So if a case has a fuzzy score in the set "cases under high coercive pressure" of 0.25 and 0.5 score in the set "cases with high cognitive capacity", its membership in the set of cases that are subject to high coercive pressure and have high cognitive capacity is the minimum, which is 0.25. The logical "OR" refers to the union of sets and in the fuzzy logic a researcher focuses on the maximum of each case's membership in the component sets. That is the fuzzy membership of a case in a set formed from the union of two or more other sets is found by taking its maximum membership in the original sets. In the above example the fuzzy membership of a case in the set of the cases that are subject to high coercive pressure or have high cognitive capacity about SCS is the greatest membership in these two sets, which is 0.5.

Negation in crisp analysis switches the case between the two states of present and absent (1 and 0). In fuzzy logic negation of a fuzzy set can be found by simply subtracting its membership from one (Ragin and Giesel, 2003: 68). So if a case has

a fuzzy membership of 0.75 in the set of cases that are subject to high coercive pressure then its membership in the set of cases that are subject to low coercive pressure is 1-0.75= 0.25.

Thus, the first step in applying the fuzzy set analysis is to code one's data into fuzzy scores. The next subsection will discuss the method used to recode the original data related to the main construct of interest into fuzzy scores.

**9-5-2: Recoding the original scores into fuzzy scores:**

The first step in translating quantitative variables into fuzzy sets is the selection of cut off points for the main qualitative states of full membership (1), full non-membership (0) and the point of maximum ambiguity (0.5) (Ragin, 2000:158).

The idea here is that these anchors are wholly qualitative, so the variations beyond the upper and lower limits are considered irrelevant at least from the fuzzy set logic view point (Ragin, 2000:161-162).

In general the selection of the main fuzzy set cut off points should rely on substantive knowledge (Ragin and Giesel, 2003).

Choosing the fuzzy set cut off points in this research was based on the following rationales:

1. Given that the main aim of using fuzzy analysis was to validate the results of crisp analysis, the researcher used the median scores, which have been previously used as cut off points in crisp analysis, as the point of departure to code the relevant variables into fuzzy scores. The researcher considered these median scores as cut off points of maximum ambiguity, based on the assumption that it might be difficult to judge whether or not the cases that

fall on the middle of the distribution of a particular condition are really in or out of the set of that condition. These points were given fuzzy values of 0.5 (neither in nor out).

2. To identify the upper and lower limit cut off points the researcher used the standard error of the median[18]. Adding two standard errors to the median of a particular condition and deducting two standard errors from the median would give an estimate for the 95% confidence interval in which the real value of the median in the population would fall. By doing so the researcher could take account of the error of selecting the cut off points in crisp analysis.[19]

Accordingly the upper limit of each variable was defined as the score, which is directly greater than the median plus two standard errors, while the lower limit was identified as the score, which is lower than the median minus two standard errors.

Table (9-9) shows the selected main cut off points, which represent the points of maximum ambiguity, the upper and the lower limits for each condition.

[18] The standard error of the median was calculated using the formula ($1.253\ \sigma/\ \sqrt{n}$) as suggested by Lewis and Traill (1999: p. 255). Using this statistical measure (SE. of the median) aims mainly to avoid a judgemental selection of the upper and lower limits of fuzzy scores without having substantive knowledge about cases; it also enabled taking account of the error of selecting the cut off points in crisp analysis.

[19] Further validation and sensitivity tests of the QCA results presented in this chapter were made by using the median scores plus and minus one SE and then 3 SE recoding schemes. Results of these two recoding schemes showed identical findings to those reported in this chapter (See appendix D).

**Table (9-9): The method of selecting cut off points to code the five composite variables into fuzzy scores**

| Conditions | Median scores Maximum ambiguity | Standard error Of the median SE. | Upper limit >Median +~2 SE. | Lower limit < Median –~2 SE. |
|---|---|---|---|---|
| Coercive pressure sum 4 items (I) | 16 | 1.531 | 20 | 12 |
| Cognitive capacity sum 6 items (G) | 21.5 | 1.978 | 26 | 17 |
| Perceived legitimacy sum 3 items (L) | 12 | 1.085 | 15 | 9 |
| Organizational capacity sum 6 items (M) | 30.5 | 1.884 | 35 | 26 |
| Self-interest sum 3 items (F) | 16.5 | 0 .988 | 19 | 14 |

Based on the selected cut off points the researcher then recoded the original scores into five fuzzy score values (See Ragin, 2000: 156) as follows:

1. Respondents who received scores on the different conditions that are equal to the median (the crisp analysis cut off points) were considered at the point of maximum ambiguity and were given the fuzzy score 0.5 "neither in nor out".
2. Respondents who got scores greater than or equal to the upper limit (median + approximately 2 SE.) were considered fully in the set of the related condition and were given the fuzzy score 1 "fully in".
3. Respondents that received scores, which are less than or equal to the lower limit (median – approximately 2 SE.) were considered as fully out of the set of the condition of concern and were given a fuzzy score 0 (Fully out).
4. Respondents that had scores between the upper limit and the point of maximum ambiguity were considered more in than out and received a fuzzy score of 0.75.

5. Finally, respondents who received scores between the lower limit and the median scores (points of maximum ambiguity) were considered more out than in and were given the fuzzy score 0.25.

Table (9-10) summarizes the recoding of the original scores into fuzzy set membership scores.

**Table (9-10): the selected cut off points and the given fuzzy values for the relevant conditions.**

| | Conditions | | | | | Fuzzy scores | |
|---|---|---|---|---|---|---|---|
| | I | G | L | M | F | | |
| **Upper limit through highest** | ≥ 20 | ≥ 26 | ≥ 15 | ≥ 35 | ≥ 19 | 1 | **Fully in** |
| **Between the median score and upper limit** | 17-19 | 22-25 | 13-14 | 31-34 | 17-18 | 0.75 | **More in than out** |
| **Median scores Maximum ambiguity** | 16 | 21.5 | 12 | 30.5 | 16.5 | 0.5 | **Neither in nor out** |
| **Between the median score and lower limit** | 13-15 | 18-21 | 10-11 | 27-30 | 15-16 | 0.25 | **More out than in** |
| **Lower limit through lowest** | ≤ 12 | ≤ 17 | ≤ 9 | ≤ 26 | ≤ 14 | 0 | **Fully out** |

**I**: Set of cases under high coercive pressures
**G**: Set of cases with high cognitive capacity
**M**: Set of cases with high organizational capacity
**L**: Set of cases with high perceived legitimacy
**F**: Set of cases with high perceived self-interest

Fuzzy set membership scores received by responding companies on the different relevant conditions were also shown in table (9-11).

**Table (9-11) the fuzzy scores received by SPCs respondents on the relevant conditions and the outcome**

| Cases | SCS | I | G | M | L | F |
|---|---|---|---|---|---|---|
| 1 | 0 | 0 | 1 | 0.75 | 0 | 1 |
| 2 | 0 | 0.25 | 0 | 0 | 0 | 0.25 |
| 3 | 0 | 0 | 0 | 0 | 1 | 0 |
| 4 | 0 | 0 | 0 | 0.25 | 0 | 0.25 |
| 5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 6 | 0 | 0 | 0 | 0.75 | 0 | 0.75 |
| 7 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10 | 0 | 0 | 0 | 0 | 0 | 0 |
| 11 | 0 | 0 | 0 | 0 | 0 | 0 |
| 12 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13 | 0 | 0 | 0 | 0 | 0 | 0 |
| 14 | 0 | 0 | 0 | 0 | 0 | 0 |
| 15 | 0 | 0.5 | 0 | 0.75 | 0.25 | 0.75 |
| 16 | 0 | 0 | 0 | 0 | 0.75 | 0 |
| 17 | 0 | 0 | 0 | 0 | 0.5 | 0 |
| 18 | 0 | 1 | 0.25 | 0 | 1 | 0 |
| 19 | 0 | 1 | 0.75 | 0.25 | 0.25 | 0.25 |
| 20 | 0 | 0.25 | 0.25 | 0 | 0 | 0.75 |
| 21 | 1 | 1 | 0.75 | 1 | 1 | 0.75 |
| 22 | 1 | 1 | 1 | 0.75 | 1 | 0.25 |
| 23 | 1 | 1 | 1 | 0.75 | 0.5 | 0.75 |
| 24 | 1 | 1 | 1 | 0.75 | 0.75 | 1 |
| 25 | 1 | 1 | 1 | 0.75 | 1 | 0.75 |
| 26 | 1 | 1 | 1 | 0.75 | 1 | 0.75 |
| 27 | 1 | 1 | 1 | 1 | 1 | 1 |
| 28 | 1 | 1 | 1 | 1 | 0.25 | 0.75 |
| 29 | 1 | 1 | 1 | 1 | 1 | 0.75 |
| 30 | 1 | 1 | 1 | 1 | 0.75 | 1 |
| 31 | 1 | 1 | 1 | 0.75 | 1 | 1 |
| 32 | 1 | 1 | 1 | 0.75 | 1 | 0.75 |
| 33 | 1 | 1 | 1 | 1 | 1 | 0.75 |
| 34 | 1 | 1 | 1 | 1 | 1 | 0.75 |
| 35 | 1 | 0.5 | 0.75 | 0.75 | 0.75 | 0 |
| 36 | 1 | 1 | 1 | 0 | 0.75 | 0.75 |

**9-5-3 Results of fuzzy set analysis - necessity and sufficiency analysis:**

In fs/QCA examining necessity and sufficiency can have two types, veristic and probabilistic, yet the 'general type of test is probabilistic' (Ragin and Giesel, 2003: 68).

In the veristic form in order to be considered as a necessary condition, all the cases that exhibited this condition or combination of conditions must also display the outcome. In contrast the probabilistic form allows the researcher to make inferences about necessity and sufficiency (Ragin and Giesel, 2003: 68). According to Ragin and Giesel

*"it is possible to assess the quasi necessity or sufficiency of causal combinations using linguistic qualifiers such as "more often than not" (.50), "usually" (.65), and "almost always" (.80) and applying formal statistical tests using these benchmark proportions" (2003: 68).*

The authors further insisted that an investigator does not only choose a certain benchmark proportion that the observed percentage of the outcome variable must go beyond, but he or she additionally must examine whether or not the observed proportion is significantly larger than the selected benchmark, using probabilistic criteria.

As noted earlier, in order to search for necessary conditions a researcher examines the cases of the outcome to see whether or not they share the same cause or combination of causes (Ragin 2000: 206). That is, in the fuzzy logic, a condition might be considered as necessary if the fuzzy scores in the set of the outcome are less than or equal to their respective fuzzy scores in the set of the condition (Ragin 2000: 214-215).

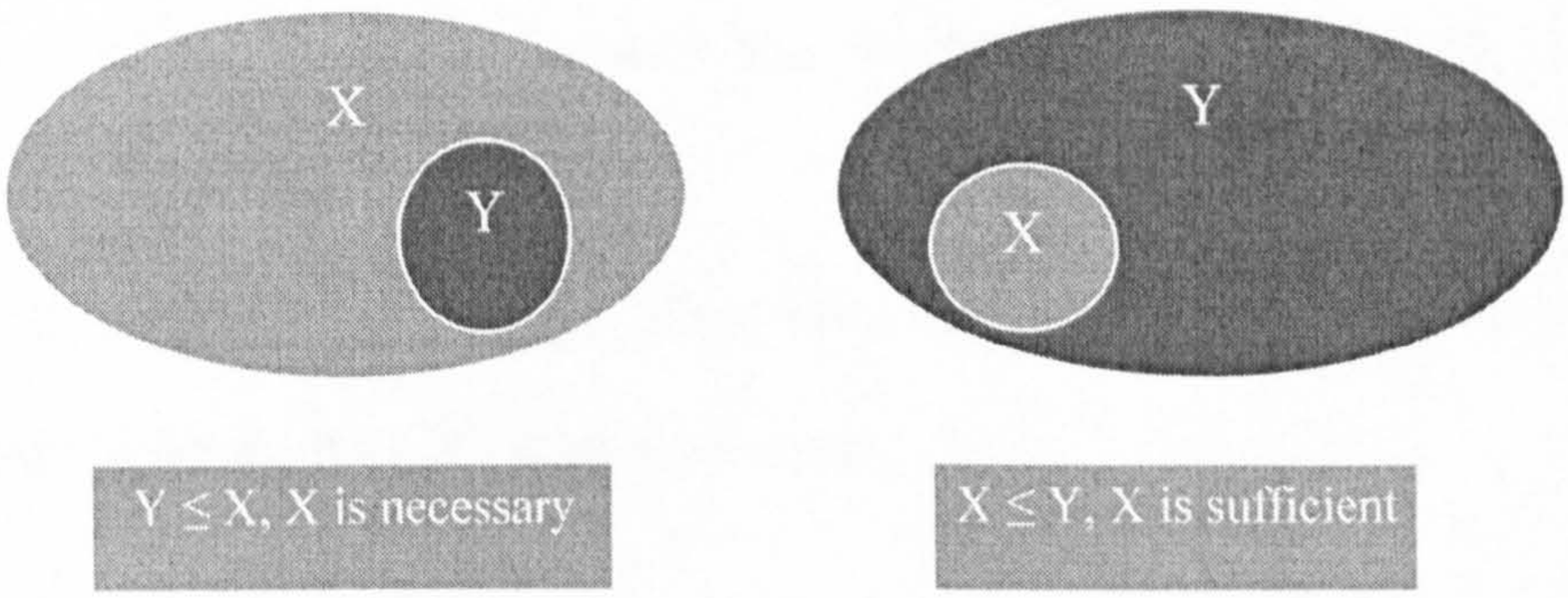
To put it differently, the instances of the outcome form a subset of the instances of the cause or the combination of causes under consideration ($Yi \leq Xi$) (Ragin 2000: 213; Ragin and Giesel, 2003: 70-71). Thus, using the probabilistic method, if the

proportion of cases, which exhibited this subset relationship is significantly greater than a test proportion, say (65%), then a researcher might claim that the condition or combination of conditions under consideration is usually necessary for the outcome to occur (Ragin 2000: 227).

To assess sufficiency a researcher tests whether or not the cases that exhibited a cause or a combination of causes form a subset of cases that displayed the outcome (Ragin 2000: 230). In fuzzy language this means that the fuzzy membership scores of cases in the set of a cause have to be less than or equal to their respective fuzzy membership in the set of the outcome ($Xi \leq Yi$) (Ragin 2000: 235). Again if the proportion of cases that exhibited this relationship is significantly greater than a test proportion, say of 65%, then a researcher might infer that the condition or the combination of conditions in question is usually sufficient to produce the outcome.

These relationships are best described using Venn diagram as shown in figure (9-1).

**Figure (9-1) Sufficiency and necessity relationships**



As the above figure shows the left hand side part of the diagram represents a relationship between the outcome Y and the condition X where the membership scores in the set of outcome Y are less than or equal to the membership scores in the set of the condition X (Y is a subset of X), making this condition a necessary condition for the outcome. The right hand side part of the diagram clarifies a relationship between the outcome Y and the condition X where the membership scores in X are less than or equal to the membership scores in the set of the outcome Y (X is a subset of Y), making this condition a sufficient condition for the outcome.

To assess sufficiency and necessity relationships between the fuzzy sets formed from the relevant conditions and the set of outcome (use of SCS) using fuzzy set logic, the research utilized fs/QCA software. As a first step the researcher tested the necessary conditions using a stringent proportion of 80%. Thus rather than using absolute criteria for assessing the necessity, fuzzy analysis allows probabilistic criteria. Using 5% significance level it is possible to test whether the proportion of cases that received fuzzy scores in the set of the outcome, which are less than or equal to their respective fuzzy scores in the set of a particular condition or combination of conditions, is significantly greater than the test proportion of (80%).

Using this restricted proportion, fuzzy set analysis resulted in no necessary or sufficient conditions at 5% significance level.

Using a less tough proportion of (65%) resulted in the following fuzzy set solution summarized in table (9-12).

**Table (9-12): Results of fs/QCA- necessity and sufficiency analysis**

| Variables | Number of cases >= Outcome | Observed proportion | Binomial P |
|---|---|---|---|
| i | 0 | 0.00 | |
| I | 15 | 0.94 | 0.010** |
| g | 0 | 0.00 | |
| G | 14 | 0.88 | 0.045* |
| l | 0 | 0.00 | |
| L | 10 | 0.62 | |
| m | 1 | 0.06 | |
| M | 7 | 0.44 | |
| f | 1 | 0.06 | |
| F | 4 | 0.25 | |

*Method: Probabilistic, Test Proportion*: 0.65, *Number of Cases Tested (Outcome > 0) = 16 (44.4% of Total), P < 0.05*

**FUZZY-SET SOLUTION *** Sufficient combinations satisfying necessary conditions**

| Expressions | Consistency (X ≤Y)[20] | Coverage (X ≤Y) |
|---|---|---|
| | | |
| I*G*L+ | 0.96 | 0.83 |
| I*G*M+ | 0.98 | 0.78 |
| I*G*F+ | 0.96 | 0.73 |
| I*G*L*M+ | 0.98 | 0.70 |
| I*G*L*F | 0.98 | 0.66 |
| Overall coverage = 0.83 | | |

*All combinations passed sufficiency test at 0.05 significance level; test proportion 65%.*

It can be seen from the table (9-12) that (94%) of respondents, whose fuzzy scores on the outcome variable is greater than 0 (users of SCS), received membership scores in the set of outcome (use of SCS), which are less than or equal to their fuzzy set membership scores in the set "cases under high coercive pressure"; (88%) of those respondents also received membership scores in the set of outcome, which are less than or equal to their fuzzy set membership scores in the set "cases with high cognitive capacity". These two conditions passed the test of

[20] Consistency measure assesses the degree to which cases sharing a particular cause or combination of causes agree in showing the outcome, while the coverage measure shows the extent to which a condition or combination of conditions "account for" or cover the cases of the outcome (Ragin, 2006: 292). The "XY plot" command in fs/QCA was used to calculate these measures (For further details about the formulae used in the calculations see Ragin, 2006: 297-303).

necessity at 5% alpha level (P = 0.01 for condition I, P= 0.045 for G) and using 65% as the test proportion. The other conditions failed to pass this test because relatively small proportions (compared to the test proportion of 65%) of the respondents received membership scores in the set of the outcome, which are less than or equal to their respective fuzzy scores in the sets of these conditions.

It can be concluded, therefore, that in the SPCs context it might be usually necessary (Ragin 2000: 109; Ragin and Giesel, 2003: 68) that those companies be under high coercive pressure and acquire high cognitive capacity in order to conform to the institutionally induced SCS.

Sufficient configurations associated with those two necessary conditions are presented in the lower part of the above table. As can be seen from the fuzzy set solution five expressions exhibited high consistency with the subset relationship ($Xi \leq Yi$) and, therefore, passed the sufficiency test at 5% significance level and using 65% as a test proportion. That is the proportions of cases whose fuzzy memberships in each of those sets of causal combinations, which are less than or equal to their respective set memberships in the set of outcome, are significantly greater than the test proportion of 65% (Ragin, 2000: 235). Thus, fuzzy set results suggest five different paths explicitly connected with the presence of SCS in SPCs. These are the combinatorial presence of high institutional coercive pressures (I), high cognitive capacity (G) and high perceived legitimacy (L); or high institutional coercive pressures (I), high cognitive capacity (G) and high organization capacity (M); or high institutional coercive pressures (I), high cognitive capacity (G) and high perceived self-interest (F); or high institutional coercive pressures (I), high cognitive capacity (G), high perceived legitimacy (L) and high organizational capacity (M); or, finally, high institutional coercive

pressures (I), high cognitive capacity (G), high perceived legitimacy (L) and high perceived self-interest (F).

Using the containment rule, the above solution can be further simplified (See Ragin 2000: 231; Ragin and Giesel, 2003: 69-70). Recall that the containment rule indicates:

*"more-complex expressions can be absorbed by less-complex expressions as long as all the elements that appear in the less-complex expression also appear in the more-complex expression" (Ragin and Giesel, 2003: 75).*

The idea here is exactly the same as, for example, the group of black people with high income is contained in the group of black people, or the group of people with high income.

Based on the containment rule, it can be seen from table (9-12) that the expression **I.G.L.M** is contained in the less- complex expressions **I.G.L** and **I.G.M,** because all the elements embodied in those two simpler expressions are embodied also in the more-complex one. Thus the complex expression **I.G.L.M** is logically redundant and can be eliminated from the final fuzzy set solution. Similarly the other complex expression found in the fuzzy solution presented in table (9-12) **I.G.L.F** is contained in the simpler expressions, **I.G.F** and **I.G.L,** again because all the elements of the less complex expressions are included in the more-complex expression. The expression **I.G.L.F** is, therefore, logically redundant and should be eliminated from the final solution of fuzzy set analysis.

Thus, the final solution of fuzzy set for the combinations of conditions connected with the presence of SCS can be expressed after eliminating the redundant expressions in the form of the following formula:

**I.G.L +I.G.M + I.G.F → SCS**

The formula can be rewritten using the set logic as follows:

**I.G (L+M+F) → SCS (6)**

Table (9-12) shows also the coverage of each combination and the overall coverage of the fuzzy solution. Coverage measure indicates that all the combinations are of strong empirical importance, although the combination (I.G.L) seems slightly more important, because it covers slightly a greater proportion (0.83) of the cases that use SCS than the other two paths, (I.G.M) and (I.G.F), which cover (0.78) and (0.73) of the cases that use SCS respectively.

Comparing formula (6), which summarizes fuzzy solution, with equation (3) that was derived from crisp logic and explains the use of SCS in SPCs reveals that the two equations are the same. It can be concluded that the fuzzy set analysis for sufficient conditions connected with the presence of SCS has resulted in the same solution as that generated by crisp analysis, which implies the validity of the results of crisp analysis and that the error of selecting the cut off points has had no serious impact on the results of this research.

As far as the negative cases are concerned, Ragin argues that it is possible to use the results of a necessity test to examine negative cases (with zero score on the outcome), particularly those that exhibited the necessary conditions yet they did not show the outcome (2000: 275).

According to Ragin, instances that received a fuzzy score 0 on both a necessary condition and on the outcome 'do not warrant further considerations'. (2000: 275)

He further argues

*"To set the stage for an outcome- to create a situation where it can occur- all the necessary conditions for that outcome must be in place. To prevent an outcome, by contrast, all that is required is to remove or interfere with a single necessary condition" (2000: 203-204).*

This means that being fully out of the set of a single necessary condition is sufficient to make a case out of the set of the outcome. Based on this line of reasoning and considering the results of the test of necessity shown in table (9-12), it can be concluded that being fully out of either of the sets I or G (the necessary conditions) would be sufficient to cause non-use of SCS. A scrutiny of table (9-11), which shows the fuzzy scores, reveals that in nearly all the negative cases (non-users, with 0 score on the outcome), the absence of SCS can be explained mainly by the absence of either of the necessary conditions I or G or both. This is consistent with the results of crisp analysis, where (i) and (g) were found as usually sufficient for the absence of SCS. It can be seen, however, that cases 18, 19 and 20 have non-zero fuzzy scores on the necessary conditions, I and G, yet they did not exhibit the outcome.

Nevertheless, it can be seen that the cases 18 and 20 received low fuzzy scores in at least one of these two necessary conditions, I and G (0.25, more out than in), in addition to the absence of other relevant conditions, which might explain the absence of the SCS in these two cases. Case number 19 has exhibited a strong fuzzy score on the two necessary conditions I and G (1 and 0.75 respectively, see table 9-11), yet it has shown non-use of SCS. Examining the other features of this case indicates that it received very low fuzzy scores (0.25 more out than in) on all the other relevant conditions. This might indicate that having very low fuzzy scores in the fuzzy sets of high organizational capacity, high perceived self-interest and high perceived legitimacy, all together, might be sufficient for non-use of SCS in this case.[21] This is actually consistent with crisp results where the

[21] Note that 11 other negative cases in table (9-11), have either 0 or 0.25 fuzzy scores on all these three conditions.

combinatorial absence of these conditions (l.m.f) was found to be sufficient for the non-use of SCS in SPCs.

Based on the above discussion it can be concluded that, similar to the results of crisp analysis (see formula 5), the absence of SCS in SPCs might be explained by either being under low coercive pressure (i), having low cognitive capacity (g) or simultaneously combining low perceived legitimacy, low organizational capacity and low perceived self-interest (l.m.f). Applying De-Morgan's law on equation (6), which is similar to equation (3) that explains the use of SCS, would result in the same solution discussed above for the conditions connected with the absence of SCS and summarized in equation (5).

All in all, the results of fuzzy set analysis discussed in this section indicate that the findings of crisp analysis seem reasonably valid and dichotomization has had no serious impact on the results of this research. Furthermore, the analogous results of both crisp analysis and fuzzy set analysis demonstrate the strength of the patterns of relationships explored in this research, they also indicate the validity of the simplifying assumptions made by the researcher concerning the selection of non-observed configurations (configurations lacking cases) for inclusion in crisp analysis.

## 9-6: The implications of the findings of applying QCA on the adoption of SCS in SPCs for NIS perspective:

Having demonstrated the validity of the crisp solution by applying fuzzy set analysis on the collected data, this section will discuss the last stage of applying QCA, which is to consider the implications of the results of set-theoretic analyses

for the extended NIS theoretical framework adopted in this research (Rihoux and Ragin, 2004: 10).

To perform this final step of applying QCA to analyse the data collected in this research the researcher used one of the most powerful features of this technique, sufficiency and necessity analysis.

According to Fiss 'necessity and sufficiency are two of the basic building blocks of causal relationships' (2005: 28) that can help in building theories capable of explaining more complicated relationships.

In crisp logic 'A cause is defined as necessary if it must be present for a certain outcome to occur' (Ragin and Giesel, 2003: 51). In other words, it must appear in all the Boolean expressions that are connected with the presence of the outcome (Ragin, 2000: 100).

Actually, the analysis of necessary conditions 'must only focus on cases showing the outcome' (Fiss, 2005: 20).

On the other hand a cause, or a combination of causes, is considered as sufficient 'if by itself it can produce a certain outcome' (Ragin and Giesel, 2003: 51).

Ragin and Giesel insist that sufficiency and necessity are typically considered together because all combinations of the two concepts are important. Thus based on the presence or the absence of necessity and sufficiency it is possible to distinguish between four groups or classifications of causes. A cause is necessary and sufficient 'if it is the only cause that produces an outcome and it is singular' (not combined with other causes); it is necessary but not sufficient if it can produce an outcome jointly with other causes and it is present in all combinations; a condition is sufficient but not necessary if by itself it can produce the outcome but it is not the only condition with such ability; lastly a condition is neither

necessary nor sufficient if it is present in only some of the combinations that generate an outcome (Ragin and Giesel, 2003: 51).

To begin the analysis of sufficient and necessary conditions connected with the practice of SCS, consider the final solutions found in crisp set and fuzzy set analyses, summarized in table (9-13).

Table (9-13) shows the final solutions for the combinations of conditions associated with the presence and the absence of SCS using both crisp set and fuzzy set analyses.

**Table (9-13) Summary of the final solutions of the crisp-set and fuzzy analyses**

| Set – theoretic method | SCS-presence: necessary conditions | SCS-presence: sufficient conditions | % coverage | SCS-Absence: sufficient conditions | % coverage |
|---|---|---|---|---|---|
| Crisp set analysis, results | I, G | **I.G.L+ | 93.75 | (i)* | 85 |
| | | **I.G.M+ | 93.75 | (g)* | 90 |
| | | *I.G.F+ | 87.50 | (l.m.f) | 60 |
| Fuzzy set analysis results | **I, *G | **I.G.L+ | 83 | (i) | 75 |
| | | **I.G.M+ | 78 | (g) | 80 |
| | | **I.G.F+ | 73 | (l.m.f) | 45 |
| Binomial test-Significance level (*P ≤ 0.05, **P ≤ 0.01). Test proportion 0.65 | | | | | |

**(I)** Set of cases under high coercive pressures
**(G)** Set of cases with high Cognitive capacity
**(M)** Set of cases with high organizational capacity
**(L)** Set of cases with high perceived legitimacy
**(F)** Set of cases with high perceived self-interest

The solution that explains the presence of SCS was summarized in equations (3) and (6) which have the following form:

**I.G (L+F+M) → SCS**

Recall that the core argument in the NIS perspective, which suggests that homogenous change in organizational structures 'is effected largely by the state and the professions' (DiMaggio and Powell, 1983: 147), and that the responsiveness to institutional demands and hence the level of isomorphic change is dependent (in addition to the other external forces) on the level of coercive

pressure exerted on organizations by other organizations upon which they are dependent (DiMaggio and Powell 1983: 150; Oliver, 1991: 168). The discussion in this section will focus on this important institutional force, which seems obvious in the SPCs' context: coercive institutional pressure (I). If the NIS perspective is held true, in this respect, one would expect, in such an apparently highly bureaucratic environment of government regulations, that being under high coercive institutional pressure from the supervisory authority should be, by itself, a necessary and sufficient condition, which is explicitly connected with the presence of SCS in SPCs.

A glance at the column labelled "SCS-presence: sufficient conditions" in crisp analysis, which also summarized in equation (3), indicates that high institutional coercive pressure (I) does exist in all the Boolean expressions, which explain the presence of SCS in SPCs. Thus, in crisp logic, and according to the above definition, this term (I) is a necessary condition for the presence of SCS in SPCs. Similarly, fuzzy analysis indicates that this condition is usually necessary for the use of SCS to occur in SPCs ($P \leq 0.01$, test proportion = 65%), which in turn is reflected in the presence of this condition in all the sufficient expressions found in the fuzzy solution as shown in the column labelled "SCS presence sufficient conditions" in the above table. That is, in such an institutional environment it appears that high coercive pressure is a necessary condition to produce the change towards the use of institutionally induced MA practices.

Clearly this finding strongly supports the NIS perspective (Meyer and Rowan, 1977; DiMaggio and Powell, 1983: 150; Oliver, 1991: 168) and the predictions of some institutionalists that 'Acquiescence best serves the organization's interests when legal coercion is high' (Oliver, 1991: 168). It seems, therefore, that SPCs

tend to adopt less active strategy and show compliance with the institutional demands of applying SCS in response to high coercive pressure from supervisory authorities. Similar findings were found in the field of business research (Clemens and Douglas, 2005: 1210), but using a correlation approach.

While necessity, as part of the causal relationship between responsiveness to institutionally induced SCS and the level of coercive pressure, is supported in this research, apparently validating the predictions of the NIS perspective, sufficiency analysis tells a different story. For high coercive pressure (I) to be a sufficient condition to cause the outcome it should be capable **by itself** of producing the use of SCS in SPCs context as the NIS implies. The solutions of both crisp set and fuzzy set analyses for the combinations of conditions connected with the presence of SCS (See the columns "SCS presence: sufficient combinations" in table 9-13) suggest that high coercive pressure is not a sufficient condition to produce the use of SCS in SPCs. This is because there is no such a Boolean expression, where (I) stands alone in producing the presence of SCS. It was the combination of this condition with the other intra-organizational elements that led to the outcome (use of SCS).

Furthermore, high coercive pressure (I) was not the only necessary condition to produce the presence of SCS in SPCs. Crisp set analysis shows that high cognitive capacity (G) is also a necessary condition for the presence of SCS in those companies. Likewise, fuzzy set analysis (see the column labelled SCS presence necessary conditions in table (9-13)) suggests that cognitive capacity is usually a

necessary condition for the use of SCS in SPCs. ($P \leq 0.05$, test proportion = 65%).[22]

Obviously the latter finding provides strong support for the evidence cited in the MA literature, which considered cognitive capacity in terms of the training and knowledge acquired by internal actors as one of the important factors that seem to affect MA change (Blumberg & Pringle, 1982; Major and Hooper, 2005: 226; Nouri & Parker, 1998: 470; Waweru *et al*, 2004: 690; Edwards *et al*, 2002: 35; Burns and Scapens, 2000: 17). The findings in this research, however, indicate that cognitive capacity and acquiring sufficient knowledge about MA practices is probably a prerequisite (necessary) condition for conformity to institutionally induced practices.

Again it should be noted that being necessary satisfies only one of the main components of causal relationship. To claim causality between a condition and outcome the condition should be necessary **and** sufficient to produce the outcome. There is yet no such expression in the crisp solution shown in equations (3) and (6), where cognitive capacity (G) stands alone in producing the presence of SCS.

One important finding then, that can be derived from the crisp solution, which explains the presence of SCS in SPCs, is that, while the combinatorial presence of high coercive pressure (I) and high cognitive capacity (G) is a necessary combination to produce the accounting change in this highly bureaucratic context, such a combination, however, seems not sufficient. What makes such coexistence matter is its combination with the other intra-organizational capacity and willingness elements.

---

[22] Note that these two conditions were found to be the most important predictors from variable-oriented research point of view, because they have the highest correlation coefficient values. (See table 8-1, chapter 8)

Again a scrutiny of the column labelled "SCS presence: sufficient conditions" in table (9-13) shows three combinations of high coercive pressure and high cognitive capacity with other intra-organizational factors that are sufficient to produce the use of SCS in SPCs contexts. These are the combinations of high coercive pressure and high cognitive capacity with either perceiving high legitimacy from using SCS (I.G.L), having high organizational capacity (I.G.M) or perceiving high self-interest from adopting the system (I.G.F). Looking at the coverage measure reveals that each of these combinations covers a high proportion of the cases that reported use of SCS, indicating that all these combinations are of considerable empirical importance. In terms of comparison, it can be seen that using fuzzy analysis as a more elegant measurement of set membership lowered the coverage of each of the sufficient combinations compared to QCA, yet the coverage of fuzzy set solution remained strong (overall overage= 0.83 of the cases that use SCS).

It can be seen also from comparing the coverage of each combination that the combination (I.G.F) is the least important in the two analyses. The other two combinations (I.G.L and I.G.M) are of very similar importance. The coverage of I.G.L in fuzzy analysis (0.83), however, is slightly higher than the coverage of I.G.M (0.78), which might suggest that the use of SCS in SPCs might be more affected by the combination of high coercive pressure and high cognitive capacity with perceiving high legitimacy benefits from using SCS. Yet the use of SCS seems also significantly affected by the combination of high coercive pressure and high cognitive capacity with the availability of high organizational capacity, and perceiving high self interest from using SCS.

Certainly this result provides strong empirical evidence for a major drawback of the NIS perspective. The theory implies that external forces, particularly coercive pressures, are necessary and sufficient conditions, which will lead to isomorphism, while it neglects the effects of the other intra-organizational conditions in facilitating or hindering the isomorphic change. This finding in SPCs, therefore, supports the claims of NIS critics, who questioned the adequacy of this approach in providing sufficient explanations for change in organizational practices, and theorized the need to consider both extra institutional and the intra-organizational conditions (Oliver, 1991; Kraatz & Zajac 1996; Burns & Scapens 2000; Modell, 2002; Major and Hooper, 2005; Tsamenyi et al, 2006). It also validates Oliver's claim that the responsiveness of organizations to institutional pressure is conditioned by 'the willingness and ability of organizations to conform to the institutional environment' (1991: 159).

Thus, what makes the institutional pressures in SPCs matter in producing the change towards the use of SCS is not the coercive pressure by itself but this combinatorial presence and the combination of this external force with the other intra-organizational willingness and capacity factors. The findings, therefore, indicate the complementary nature of institutional predictors informed by the NIS perspective, specifically coercive pressure, and the contingent predictors (particularly internal contingencies) informed by contingency theory. Neither the institutional nor the contingent predictors considered in this research seem sufficient to explain MA change in SPCs. It was the combination of the predictors informed by the two theories, which appear to provide better explanation for the accounting change in this context.

The findings in this research and their implications for the NIS, which have been discussed so far, are further supported by examining the equation (5) that explains the absence of SCS in SPCs' context. That is **(i+ g+ l.m.f → scs)**, which is summarized in the column labelled "SCS- absence: sufficient conditions" in table (9-13).

As can be seen from table (9-13) sufficient combinations of conditions connected with the absence of SCS resulting from crisp set analysis are analogous to those logically induced from the fuzzy set solution.

While necessity analysis for the negative cases is not preferred (Fiss, 2005: 20), it can be seen from table (9-13) that low coercive pressure by itself (**i**) is sufficient to produce resistance to adopting SCS in SPCs.

Similarly, low cognitive capacity by itself (**g**) could be a sufficient cause of bounding the ability of some SPCs to adhere to the institutionally induced SCS.

The absence of sufficient cognitive capabilities and experiencing low coercive pressure from supervisory authorities are the more likely explanations for the absence of SCS in SPCs because these two paths covered, respectively, (90%) and (85%) of the cases, which exhibited non-use of the technique (both conditions passed Binomial test at 5% significance level). The coverage proportions suggest also that low cognitive capacity is a slightly more important explanation of non-use of SCS in SPCs, because it covers a little higher proportion of non-users.

Obviously these two expressions are consistent with the above discussion, which demonstrated that these two conditions were necessary for the occurrence of MA change in SPCs. The absence of either these necessary conditions is sufficient to cause non-use of SCS.

The fact that low coercive pressure seems a sufficient condition to cause resistance to the diffusion of the institutionally induced SCS in SPCs might validate Oliver's prediction that

*"The lower the degree of legal coercion behind institutional norms and requirements, the greater the likelihood of organizational resistance to institutional pressures" (1991: 167-168).*

Thus, while the regulations required the use of SCS in all SPCs, it was the seriousness of the coercion imposed on them by supervisory bodies upon which they are dependent, which appears to have a considerable impact on the responsiveness of SPCs to such requirements.

Likewise, the finding that low cognitive capacity might be sufficient to cause resistance to the adoption of SCS in SPCs provides further support to the claims of some MA researchers concerning the impact of lack of knowledge and experience on hindering MA change (Burns and Scapens, 2000:17; Drury, 1996: 635-636). This additionally might validate Oliver's prediction that 'lack of recognition or awareness of institutional expectations limit the ability of organizations to conform to institutional requirements' (1991: 159).

The final expression of crisp solution shown in the column labelled "SCS-absence: sufficient conditions" in table (9-13) says that, regardless of whether the other necessary conditions are present or not, the combination of low perceived legitimacy and low perceived self-interest from using SCS combined with low organizational capacity (**l.m.f**) was sufficient to cause resistance to the use of SCS and restricted MA change in this context. This indicates the importance of motive related and organizational capacity related factors. The above expression might support the claim that competing interests might cause resistance to change (Burns and Scapens, 2000:17; Granlund, 2001: 162). It indicates, however, that lack of

self-interest may matter only if combined with the lack of other motivations, such as legitimacy benefits, and low organizational capacity.

Again this finding supports the above discussion, which stressed that it is the combination of high coercive pressure, high cognitive capacity and some other elements of willingness and organizational capacity, which made the change possible.

Findings in this research also support Chenhall's (2003) views that the external environment continues to be one of the important variables in MA research. It also demonstrates the profound impact of the institutional environment on provoking the change in MA practices in such contexts.

Insights gained from the analysis in this chapter imply that although contingency theory might be regarded as a more comprehensive approach, compared to NIS, because it considers both external and internal conditions, which govern MA change, the two approaches should not be viewed as mutually exclusive. Rather they should be considered as complementing each other and combining the two approaches would provide better explanations for the factors that affect how organizations respond to the pressures that entail a change in MA practices (Chenhall, 2003).

QCA findings reported in this chapter have also implications for policy makers of the public sector in Syria concerning the conditions under which conformity or resistance to the adoption of MA practices might occur.

The application of QCA analysis demonstrates the complexity of MA change. Using this novel technique is one of the main contributions of this research, and it should draw the attention of future MA researchers to the potential benefits of this technique in capturing the complexity of MA change as social phenomenon.

Finally, like other techniques, the benefits of set-theoretic methods come at a cost. The application of QCA in this research has the following limitations[23]:

1- Including many variables in QCA models complicate the QCA analysis. Moreover, including irrelevant variables in QCA models lead to contradictions (cases with the same configuration, but with different outcomes). Including only very few variables, however, leads to a danger of missing important variables. Users of QCA should, therefore, be aware of this issue, and rely on theory to select relevant variables and use the absence of contradictions in their model as an indication of correct selection of variables (Ragin, 2000). In this research eight variables were initially considered and the relevant variables included in QCA (five variables) resulted in no contradiction, indicating the proper selection of relevant variables in this research. The abandoned irrelevant variables were also found to be less relevant from a set-theoretic point of view and including them in the analysis led to many contradictions. The need for proper selection of variables, however, applies equally to conventional quantitative research techniques.

2- QCA allows reduction of the number of combinations if two combinations differing in a single variable lead to the same outcome. Researchers should be aware that if there are two combinations, eg. ABCD and ABCd then a single occurrence of ABCd will be sufficient to reduce the combination to ABC no matter how many occurrences of ABCD may have been observed.

3- Dividing a continuous variable into two sets included a somewhat arbitrary division and, in this research, the median was used to make the cut. The loss of

[23] Some of these limitations were raised by examiners in the viva

information that this entails was addressed by employing fuzzy as well as crisp set analysis to show that the results are robust to this assumption.

4- There may be low variability in a particular variable thus limiting the analysis. In practice such a variable would probably be irrelevant because of low correlation with the dependent variable. Substantive knowledge should play also a vital role in the selection of variables and in their calibration into crisp and fuzzy sets.

## 9-7 Summary of chapter 9:

This chapter has explored the interplay between the most significant institutional and intra-organizational factors associated with the extent of use of SCS by applying set-theoretic logic. The aim was to add to our understanding for the different combinations of institutional and intra-organizational conditions under which resistance or conformity of SPCs to the institutionally induced SCS have occurred. Results of crisp analysis showed two conditions, which might be necessary for the use of SCS in SPCs, high coercive pressure and high cognitive capacity. Results of fuzzy set supported this finding where these two conditions were found as usually necessary for the use of SCS to occur ($P \leq 0.01$ and $P \leq 0.05$ respectively, test proportion is 65%).

Results in this research partly favoured the institutional explanation in that high coercive pressures seemed to be a necessary condition for conformity of SPCs to the institutionally induced SCS, which in turn sustains institutionalists' predictions of high conformity in response to high coercive pressures (DiMaggio and Powell, 1983; Oliver, 1991).

Contrary to what NIS implies, however, coercion appears to be an insufficient condition for conformity. It was the combination of both high coercive pressure and high cognitive capacity with the other intra-organizational contingencies, which made the conformity possible. Three combinations were found in crisp analysis as sufficient to produce the use of SCS: the combinatorial presence of high coercive pressure, high cognitive capacity and high perceived legitimacy **(I.G.L)**; or the combination of high coercive pressure, high cognitive capacity

and high organizational capacity **(I.G.M)**; or the combination of high coercive pressure, high cognitive capacity and high perceived self-interest **(I.G.F).** This finding was further supported in the fuzzy set analysis, which showed that the above-mentioned combinations are usually sufficient to produce the use of SCS in SPCs ($P \leq 0.05$, test proportion 65%). Sufficient combinations suggest that the combinatorial presence of high coercive pressure and high cognitive capacity might matter only if combined with high perceived legitimacy, high organizational capacity or high perceived self-interest. This result might question the adequacy of the NIS perspective and support the views of new theoretical thinking, in organizational theory in general, and in MA research in particular, for the need to combine institutional views of organization with other intra-organizational contingencies to better understand organizational behaviour and how it might affect MA change (Oliver, 1991, 1997; Modell 2002; Chenhall, 2003; Tsamenyi, et al, 2006).

The findings summarized so far were further supported with the analysis of the combinations of conditions connected with the absence of SCS. Three different paths were found to be sufficient to cause resistance to SCS in SPCs: being under low coercive pressure by itself (**i**), acquiring low cognitive capacity by itself (**g**) or the combination of low perceived legitimacy, low organizational capacity and low perceived self-interest (**l.m.f**). The same results were logically deduced from fuzzy analysis results. Set-theoretic findings reported in this chapter have important implications for MA theory, by revealing the complementary nature of NIS predictors, specifically coercive pressures, and the other intra- organizational contingencies. This might suggest the need for future research to consider both institutional and contingent predictors, to better understand MA change. The

findings have implications also for decision makers and public policy setters in SPCs particularly with the growing concern in managerial reform of public sector in Syria.

Finally, the application of set-theoretic techniques in this chapter indicates the usefulness of this approach in capturing the complexity of MA change as a social phenomenon. However, some limitations of this technique, like other techniques, should be beard in mind.

# Chapter (10): The research summary and conclusions

## 10-1: Introduction

This chapter provides a summary of the research processes and the main conclusions that can be drawn from the data analysis procedures performed to achieve the research objectives. The next section will present the summary of the research aims and the methods used to answer the research questions, the section that follows will outline the major conclusions that can be drawn from the data analysis procedures carried out in this thesis.

## 10-2: The research summary

The research was driven mainly by two main observations, one could be seen in the MA literature in general, and the other is related to the Syrian MA literature. On one hand MA literature shows a wide use of standard costing system (SCS) in different countries despite the intensive criticisms of some MA researchers in relation to the incompatibility of the technique with the conditions of new business environment. This observation undermines the assumption that MA change is derived by the need to improve efficiency and maximizing profit, a basic foundation of contingency theory, and supports the new institutional sociology (NIS) premises of isomorphism and homogeneity of organizational practices. On the other hand, another striking observation in the Syrian MA literature concerns the lack of evidence for the extent of use of SCS in Syrian public companies (SPCs), and the suspicions of Syrian authors about the actual practice, despite a unified accounting system legally endorsed in 1978 that mandated that all SPCs (government owned) should use SCS. This observation in the Syrian MA literature seems to undermine the assumption of the inexorable conformity to institutional pressure, for which the NIS has been criticised. In addition to their denial of some

basic foundations of the most dominant theories in MA research, namely the institutional and contingency theories, the above mentioned observations, coincide with the controversy among organizational theorists and MA researchers alike, pertaining to the inadequacy of the (NIS) to explain the conforming or resisting behaviours of organizations, and the need to explore the interplay between the NIS predictors and the other intra-organizational contingent elements to better understand the forces that govern MA change.

Built on some MA and organizational theory researchers' arguments this thesis raised three main questions:

First, to what extent is SCS actually in use, and how has it been implemented in SPCs and what insights can be gained from this implementation?

Second, to what extent are different institutional coercive, technical (competitive) and intra-organizational willingness and capacity factors associated with the extent of use of SCS in SPCs?

Third, how are the most relevant factors combined together, and in what ways in affecting the conformity or resistance of SPCs to the adoption of institutionally induced SCS?

To answer these questions this research was conducted over three main stages. The first stage involved literature search for the conditions connected with the development of SCS theory in general, and the peculiarities of introducing SCS into SPCs context in particular, using a suggested theoretical framework based on an adjusted model of NIS. In the second stage qualitative data was collected through interviews held at the Ministry of Industry in Syria and one general

organization and several SPCs in September 2004. These two initial stages facilitated the last stage, which involved the design of the research instrument and the collection of the main data used in this thesis.

In the last stage of the research hand-delivered questionnaires were distributed to a cluster sample of 53 companies, randomly selected from a population of 96 companies representing all the SPCs that are clearly manufacturing firms and work under the supervision of the Ministry of Industry in Syria. Questionnaires were distributed and recollected by hand in June and July 2005. 36 completed questionnaires were collected resulting in a response rate of (78.26%) after taking into consideration 7 ineligible cases (non-active). The sample and the population were compared in terms of number of employees (mean number of employees in the sample = 1062.39) and industry type to test for non-response bias and no significant differences were detected between the sample and the population from where it has been selected. Respondents were financial controllers (58.3%), account managers (16.7%) and cost department managers (25%). Respondents' mean years of experience in the position and the company were (10.68) and (17.38) respectively; and most of them had undergraduate certificate (66.7%), while the vast majority did not have a professional qualification (91.7%), which implies in turn a very low diffusion of the professional knowledge in the SPCs. The major conclusions that can be drawn from the data analysis procedures carried out on the data collected in this thesis will be summarized in the subsequent sections.

## 10-3 Conclusions concerning the practice of SCS in SPCs:

- Standard costing seems not well used in SPCs as only 44.4% of the respondents reported use of SCS in some form, and 38.9% of those companies mentioned partial use of the system. The majority of the SPCs in the sample reported non-use of SCS (55.6%) and exhibited resistance to the institutional pressures, which seemingly required its use.
- The partial use is manifested through the types of standards used and variances reported. All SPC users in this research used either engineering studies (56.2%) or, to a greater extent, average of historical usage (68.8%) to establish direct material quantity standards; few, however, have established direct material price standards (31.2%), direct labour efficiency standards (43.8%), and wage rate standards (6.2%). None of the companies have mentioned usage of fixed or variable overhead standard rates. Current attainable standards are the main type of standards used in SPCs (62.5%), yet there are some companies that did use basic standards (37.5%). The majority of SPC users revised their standards whenever the variances indicated a change in the standards (50%), while (31.2%) of them left their standards unchanged for a long period of time. All companies calculated direct material quantity variance, (87.5%) calculated total direct material variance, and (25%) of them mentioned calculation of direct labour efficiency variance, but very little usage, or complete non-use, of all other variances has been documented.
- Contrary to the prevailing approach of operating SCS in western countries and some other developing countries, variances in all SPCs are calculated and reported statistically and not recorded in the books, which in turn

reflected its effect on the purposes for which standards are used. In general SPCs tend to attach 'above average to vital' importance to using SCS for controlling costs (81.3%), to compute product costs for decision-making (62.5%), and use standards as an aid for budgeting (93.8%). The usage of SCS to cost inventory which seems to have considerable importance in western countries (see Drury *et al*, 1993: 35) was considered by all SPC users of SCS to be of less importance, reflecting the different approach used by SPCs in operating SCS from the prevailing accounting approach well known in the literature. This is actually an interesting conclusion, as while there are some hints in the literature, which referred to this rudimentary use of SCS based on the statistical approach (Benninger, 1950), there is, however, little empirical evidence in the literature for the existence of such approach of operating SCS; this research provides support for the existence of such a method of operating SCS in practice.

- Possible explanations for the partial use of SCS seem to favour institutional reasoning as (86.7%) of SPCs users tend to agree that contradictory regulations, such as those related to employment, have influenced the type of standards they have used. This might lend support to the claims of some institutionalists (Oliver, 1991, 163) that contradictory pressures prevent organizational conformity to the institutional demands, which in turn reflects the profound impact of the institutional environment in SPCs context, not only on the adoption of SCS as a MA tool, but also on how this technique has been actually implemented. Other intra-organizational factors, such as the use of

budgets (66.7%) to control cost elements, controllability of cost items (64.3%) have been reported as affecting the way in which SCS has been used.

- The practice of SCS in SPCs reflects the same divergences between authors' ideologies about what is thought to be good practices, and what the practitioners are really doing, which have been pointed out in the SCS literature (Drury, 1993; Dugdale et al 2006). While Syrian authors explained SCS and how to operate the system (Fakher, 1993; Hanan, 1987), SPCs seem to place their emphasis on direct materials and show very low emphasis on controlling the other cost elements through standards. This finding might suggest that companies might show a general isomorphic appearance in order to legitimate their behaviours. However, they might accommodate MA techniques according to their internal conditions and needs, because of their limited ability to adhere to such ideologies as are mandated or thought to be socially accepted. There is, therefore, decoupling within the organization so that operational practices differ markedly from textbook prescriptions. This decoupling seems to be more affected by the conflicting institutional pressures in SPCs context.
- Nearly all of the SPCs users reported extensive use of traditional MA techniques, such as budgeting (100%) and financial performance measures (93%). Partial use of other techniques such as non-financial performance measures (40%), TQM (50%), JIT (20%) have been also documented, while none of the companies use ABC. This might indicate

that, although SPCs have shown partial use of SCS they did use extensively some other techniques as an aid to control cost elements.

- There is no indication, in this research, that SCS is really obsolete. SCS seems to still have benefits to render to organizations. SPCs evidence suggests, however, that organizations might use SCS in certain areas where the system might be useful, given the contexts in which they are operating, and probably as a complementary technique to several other MA tools and innovative practices, to help them manage businesses more effectively in the conditions of the new manufacturing environment. The practice of SCS in SPCs, therefore, seems to support the claims concerning the possibility of partially using SCS, and that it might be used as one, among a broader set of performance measurement devices (Drury, 2000: 766; Wood & Sangster, 2005: 615).

## 10-4: Conclusions drawn from the statistical analysis and hypotheses' testing

Hypotheses' testing was used as an intermediate stage, which aimed to explore the most relevant factors that are associated with the extent of use of SCS. Eight hypotheses were developed in this thesis, connecting eight institutional coercive, technical (competitive), and intra-organizational willingness and capacity factors with the extent of use of SCS. The factors were composite variables measured using indexes. Indicators included in each index were extracted from the literature search and interviewees' perceptions of the conditions that affected the practice of SCS, which the researcher gathered during the fieldwork visits. These indicators were tested for reliability and unidimensionality using Cronbach's alpha analysis

(minimum alpha = 0.729), before using them to develop the indexes used in the procedure of hypotheses' testing. The hypotheses were tested using Kendall's tau statistics which were deemed appropriate, given the ordinal level of measurement of the composite variables and the extent of use of SCS as a dependent variable. A further check of the hypotheses' testing was made by conducting Mann-Whitney test, in order to detect the differences in the scores received by the two groups of users and non-users of SCS in SPCs on the eight composite variables. Insights and conclusions derived from this step of data analysis can be summarized as follows:

- Results of Kendall's tau test indicated that the extent of use of SCS in SPCs is found to be positively and significantly ($P < 0.01$) associated with the level of coercive pressures ($T= 0.681$), the level of cognitive capacity ($T= 0.686$), the level of organizational capacity ($T= 0.657$), the willingness to attain legitimacy ($T= 0.593$) and the willingness to attain self-interest ($T= 0.531$) factors. Results of the Mann-Whitney test, which compared the two groups of SPCs, that reported use of SCS in some form and those that reported non-use, supported the findings of Kendall's tau test, and significant differences between the scores received by the respondents in these two groups on the above mentioned variables were also detected ($P < 0.01$). These results support some of Oliver's (1991) predictions of positive relationships between the responsiveness of organizations and the level of coercive pressure and perceived legitimacy. They also lend support to the claims of some MA researchers concerning the relevance of cognitive capacity (knowledge and awareness) and self-interest behaviours of individuals in affecting the change in MA practices ( Burns and Scapens, 2000: 17; Granlund, 2001: 162).

- Results of Kendall's tau test support the claims of some MA researchers that organizations might use accounting information for different purposes (Drury, 2004: 711). There is some evidence in this research for the coexistence of legitimacy seeking and efficiency enhancing and that these two motives do not conflict each other, in that both these variables are positively correlated with the extent of use of SCS, although the variable "perceived economic gains" did not reach the conventional level of significance ($P = 0.058 > 0.05$). This finding may provide some confirmation of Oliver's prediction of more likely resistance in response to low perceived economic gains (1991: 160-161). It also supports Modell's findings of the coexistence of efficiency enhancing and legitimacy seeking motives in shaping MA change (2001: 457). SPCs, however, seem to place more emphasis on legitimating their behaviour than enhancing their performance. This might confirm strongly the beliefs of some organizational theorists that when the adoption of some organizational practices is more motivated by institutional pressures for conformity, rather than technical requirements, firms may realize legitimacy benefits rather than technical performance benefits from adoption (Clemens and Douglas, 2005: 1207; Westphal et al, 1997: 368).
- Results of both Kendall's tau and Mann-Whitney tests detected no significant relationship ($P = 0.394, 0.671$ respectively) between the extent of use of SCS in SPCs and the level of competitive pressures they are confronting, despite the evidence that the majority (63.9%) of SPCs in the cluster sample seems to be under high competitive pressures. This might suggest that, while it is true that organizations may confront both

technical and institutional pressures for change (Oliver, 1997: 100; Major & Hopper, 2003: 25- 26; Scott and Mayer, 1991: 123; Tsamenyi *et al*, 2006: 412-413), evidence found in this research proposes that in such contexts, where institutional pressure is coercively imposed, the institutional environment seems to outweigh in its impact the technical environment, thereby supporting the claims of some MA researchers (Modell, 2002: 670).

- The results of statistical tests used in this research, show also that technological task requirements are irrelevant in affecting the use of SCS. Interestingly the majority of SPC non-users of SCS seem to have a technological environment suitable for the system (60%). This might suggest, and contrary to what Fry et al (1998: 509) found in the USA, that the majority of SPCs did not use SCS in environments which seem suitable for such use. This mismatch might be attributed to the other factors considered in this research.
- Results of hypothesis testing suggest also that the coercive pressure and the level of cognitive capacity might be the most important predictors for the use of SCS in SPCs, because they are the variables with the highest correlation coefficients (0.681 and 0.686 respectively).
- One of the main contributions of this research is the development of highly reliable measures for the majority of institutional and contingent concepts used in this thesis, which are still not well measured in MA research, such as coercive pressure, cognitive capacity, perceived legitimacy, perceived economic gains and perceived self interest. There

is, however, a need to examine the reliability of these measures in other contexts using larger samples.

## 10-5: Conclusions drawn from the application of QCA and set-theoretic analysis

To capture the complexity of MA change in SPCs and explore the interplay between the most relevant institutional and intra-organizational contingent factors and their combinatorial effect on the conformity or resistance of SPCs to the institutionally provoked SCS, qualitative comparative analysis QCA was utilized. Fuzzy-set logic was also used to provide validation of the QCA analysis results. The two techniques have shown the same findings. The following are the main conclusions that can be drawn from the application of QCA and fuzzy-set analyses.

- Both QCA and fuzzy set analysis showed that, being under high institutional coercive pressures was usually a necessary condition for the conformity of SPCs to the institutionally induced SCS (P = 0.01, test proportion = 65%). This might suggest that in such highly institutional environments, it might be necessary that organizations be under high coercive pressure in order to conform to institutional demands. This finding strongly supports NIS predictions of more conformity in response to high institutional coercive pressures, and the findings in some organizational theory research (Clemens and Douglas, 2005: 1210; DiMaggio and Powell, 1983: 150; Meyer and Rowan, 1977; Oliver, 1991: 168).

- Tests of necessity using both QCA and fuzzy analyses revealed also that acquiring high cognitive capacity was usually a necessary condition for SPCs to use the system (P = 0.045, test proportion = 65%). Obviously this finding provides strong support for the evidence cited in the MA literature, which considered cognitive capacity, in terms of the training and knowledge acquired by internal actors, as one of the important factors that affect MA change (Blumberg & Pringle, 1982; Major and Hooper, 2005: 226; Nouri & Parker, 1998: 470; Waweru *et al*, 2004: 690; Edwards *et al*, 2002: 35; Burns and Scapens, 2000: 17). The results in this research, however, indicate that cognitive capacity and acquiring sufficient knowledge about institutionally provoked MA practices is probably a prerequisite (necessary) condition for conformity to these practices.
- While necessity analysis in this research lends strong support to NIS explanations of organizational behaviour, it was found that coercive pressure was not a sufficient condition for conformity in the SPCs' context. Results of both QCA and fuzzy analyses showed three combinations of the most relevant factors considered in this research, which were usually sufficient for the adoption of SCS by the SPCs that reported usage of the system. These are the combination of high coercive pressures and high cognitive capacity with either high perceived legitimacy (**I.G.L**, coverage = 93.75% in QCA, and 83% in fuzzy analysis), high organizational capacity (**I.G.M**, coverage = 93.75% in QCA, and 78% in fuzzy analysis), or high perceived self-interest (**I.G.F**, coverage = 87.50% in QCA, and 73% in fuzzy analysis). The coverage measure suggests that all these combinations are of considerable

empirical importance in explaining the use of SCS because they cover high proportions of SPCs, which reported use of SCS, although the first two combinations (**I.G.L** and **I.G.M**) seem to be more important. These three combinations indicate that the necessary coexistence of high coercive pressures and high cognitive capacity factors may matter only if it is combined with either perceiving high legitimacy benefits from conformity, having high organizational capacity, or perceiving high self-interest from acquiescence to institutional demands. Certainly this result provides strong empirical evidence for a major drawback of the NIS perspective. The theory implies that external forces, particularly coercive pressures, are necessary and sufficient conditions, which will lead to isomorphism, while it neglects the effects of the other intra-organizational conditions in facilitating or hindering the isomorphic change. This finding in SPCs, therefore, supports the claims of NIS critics, who questioned the adequacy of this approach in providing sufficient explanations for change in organizational practices, and theorized the need to consider both extra-institutional and the intra-organizational conditions (Oliver, 1991; Kraatz & Zajac 1996; Burns & Scapens 2000; Modell, 2002; Major and Hooper, 2005; Tsamenyi et al, 2006). It also validates Oliver's claim that the responsiveness of organizations to institutional pressure is conditioned by their willingness and ability to conform to the institutional environment (1991: 159). It additionally demonstrates the combinatorial effects of NIS predictors, specifically coercive pressures, and intra-organizational willingness and capacity contingencies in shaping MA change, thereby supporting some MA researchers' concerns about the need to combine the

NIS approach with other intra-organizational contingent elements to better understand MA change (Burns & Scapens 2000; Chenhall, 2003; Major and Hooper, 2005; Modell, 2001, 2002; Tsamenyi, et al, 2006).

- The application of QCA made it possible not only to explore the combinations of conditions necessary and sufficient for the MA change to happen in SPCs, but it helped also in showing the sufficient combinations to cause resistance to change, which has been generally overlooked in MA research (Granlund, 2001: 143). The combinations of conditions connected with resistance to adoption of SCS by some SPCs support those presented so far, concerning the use of SCS. Both QCA and fuzzy analysis, suggest three different paths, which might be sufficient to cause resistance to the adoption of SCS in SPCs. These are being under low coercive pressure by itself (**i**, coverage = 85%), having low cognitive capacity by itself (**g**, coverage = 90%), or simultaneously having low organizational capacity, perceiving low legitimacy and low self-interest from using SCS (**l.m.f**, coverage = 60%). This might suggest that in a highly institutional bureaucratic environment being under low coercive pressure by itself might be a sufficient condition for resisting adoption of institutionally provoked practices. This tends to confirm Oliver's prediction of more likely resistance to institutional demands in response to low coercion (1991: 167-168). Lack of sufficient knowledge might be also sufficient by itself to prevent MA change. This tends to validate the predictions of organizational theorists and MA researchers alike that lack of recognition and knowledge of institutionally provoked practices limit

the ability of organizations to conform to institutional requirements (Burns and Scapens, 2000:17; Oliver, 1991: 159). The final expression indicates also that regardless of whether the other necessary conditions are present or not, the combination of low perceived legitimacy and low organizational capacity combined with low perceived self-interest from using SCS (**l.m.f**) was sufficient to cause resistance to the use of SCS and restricted MA change in some SPCs. This indicates the importance of motive related and organizational capacity related factors. The above expression might support also the claim that self-interest might cause resistance to change (Burns and Scapens, 2000:17; Granlund, 2001: 162). It indicates, however, that lack of self-interest may matter only if combined with the lack of other motivations, such as legitimacy benefits, and low organizational capacity. The coverage measure suggests that low cognitive capacity and low coercive pressure are empirically more important than the last expression (**l.m.f**) in explaining the non-use of SCS in SPCs, because they relatively cover higher proportion of SPC non-users (90% and 85% respectively).

These results are consistent with the previous discussion that identified (**I**) and (**G**) as necessary for conformity and **I.G.L**, **I.G.M**, and **I.G.F** as sufficient combinations. If (I) is absent (i) then this is sufficient to prevent conformity; if (G) is absent (g) this is also sufficient to prevent conformity and if L, M and F are simultaneously absent (l.m.f) then this is sufficient to prevent conformity.

Additionally these results are consistent with the findings of hypotheses' testing reported above, where these two important conditions (coercive

pressure and cognitive capacity) were found to be the most statistically significant factors.

- The interplay between both institutional and intra-organizational contingent factors and their combinatorial effects explored in this research demonstrate that neither institutional coercive pressure nor the other intra-organizational contingencies, considered in this enquiry, were sufficient to explain MA change in SPCs context. Findings in this research, therefore, indicate the complementary nature of institutional predictors informed by the NIS perspective and the contingent predictors (particularly internal contingencies) informed by contingency theory. This might indicate the need for future research to consider elements of the two theories in order to provide better explanations for the forces that govern MA change (Chenhall, 2003).

- The QCA approach, adopted in this research to explore the conditions under which conformity and resistance of SPCs to the institutionally induced SCS did occur, has special implications also for the policy setters in the public sector in Syria, by drawing their attention to the conditions that should be secured by Syrian supervisory authorities to enable the use of SCS in the SPCs.

- The application of set-theoretic approach in SPCs context demonstrates the complexity of MA change. It has been largely considered that MA change is both complex and difficult to achieve (Granlund, 2001). The

findings of this research might give an answer to one tricky question raised by some MA researchers, of why MA change is difficult to achieve (Granlund, 2001: 144). The findings of this research suggest that MA change is a complex phenomenon of an equifinal and conjunctural nature. Such complexity makes successful MA change difficult to occur. To achieve MA change all the necessary conditions must be in place and absence of any of the necessary conditions would be sufficient to lead to failure to change. Necessary conditions, however, might combine with other relevant conditions in different ways to produce the accounting change. Lack of understanding of MA change might be attributed to the reliance on conventional methods, such as linear regression, which assume additive and linear models. Better understanding of MA change requires new methods capable of revealing complex causal relationships of equifinal and conjunctural nature. Using these relatively novel techniques, QCA and fuzzy analyses, is one of the main contributions of this research, which helped to reveal the complexity of MA change in SPCs context. The findings of this research should, therefore, draw the attention of future MA researchers to the potential benefits of these techniques in enhancing our understanding of the complexity of MA change as a social phenomenon.

- The main difficulty that faced the researcher in applying QCA is the absence of substantive knowledge, which could guide the formation of crisp and fuzzy sets. Keeping in depth knowledge about 36 cases was impossible. The constructs, which the researcher used, required the collection of quantitative data and the use of multiple item measures to

capture these constructs. It was, therefore, necessary to use sample dependent measures (median scores) to translate variables into crisp and fuzzy sets and to apply sensitivity analysis to validate the findings. Future MA researchers might use QCA in qualitative settings (using multiple case studies) where substantive knowledge might play an important role in the formation of fuzzy and crisp sets. QCA is still progressing and applying the method in quantitative and micro-level settings is still not well explored (Ragin and Rihoux, 2004). Thus, the approach adopted in this research to apply QCA on quantitative data, using different methods (QCA and fuzzy analysis) and, additionally, sensitivity analysis to validate the QCA findings, might be seen as a contribution to the field of set theoretic methods.

- Finally, despite the strength of the patterns of relationships and the different combinations of necessary and sufficient conditions explored in this research, together with their consistency with the general theoretical knowledge in MA, the researcher remains cautious in generalizing these patterns into other populations. This caution was dictated by the lack of combinatorial evidence and thinking in MA research, and the lack of general and explicit statements for necessary and sufficient conditions for MA change despite the considerable recognition for its complexity as a social phenomenon. Thus the explored necessary and sufficient conditions in the specific SPC setting could be seen as proposed combinations, which required further research in other settings to establish their validity.

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# *Appendixes*

## Appendix A

## The questions of the semi structured interviews:

**-General information:**

1- Name of the company ----------
2- Date of establishment: ----------
3- Address: ----------

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4- Industry: ----------

5- Main product: ----------

6- Number of employees: ----------

**About interviewee**

7- Position: ----------

8- How many years you have been working in the company? ----------

9 - Do you have any professional accounting qualification? ----------

10 - Does your company hire any professional accountants? ----------

11- Phone number: ----------

12- E-mail address: ----------

## Use of SCS:

13- Is a system of standard costing in operation in your company?

**For non users:**

14- Why in your opinion standard costing is not in use in your company?

-
-
-
-
-
-
-

15- In your opinion how scientific implementation of standard costing can be achieved in your company?

-
-
-
-
-
-
-

**For Users companies:**

15 Why the decision to install the system has been made?

Because managers have perceived the need to use the system. ☐

Because the accountants influenced the decision. ☐

Because the supervisory authority required its use. ☐

Other reasons please indicate----------

---

16 Approximately when did you start to use the technique?

| | |
|---|---|
| Less than 10 years ago | |
| 10-20 years ago | |
| 20-30 years ago | |
| More than 30 years ago | |

17 To what extent does your company use the following methods to establish direct labour and direct material standards?

| | Always | Often | Sometimes | Rarely | Never |
|---|---|---|---|---|---|
| Standards based on design / engineering studies. | | | | | |
| Observation based on trial runs. | | | | | |
| Work study techniques | | | | | |
| Average of historical usage | | | | | |

18 How frequently are the standards revised?

| | |
|---|---|
| • Monthly | |
| • Semi annually | |
| • Annually | |
| • Continuously | |
| • When variance imply that standard has changed. | |

19 Which of the following standards are usually established in your company?

| | |
|---|---|
| • Direct material quantity standards | |
| • Direct material price standards. | |
| • Direct labour quantity (hours) standards | |
| • Direct labour rate standards. | |
| • Variable overhead rate Standard. | |
| • Fixed overhead rate standard. | |

Other (please specify)----------
---
---

20 which of the listed variances are computed by your company?

| | Yes | No |
|---|---|---|
| Total direct material variance | | |
| Material price variance | | |
| Material usage variance | | |
| Material mix variance | | |
| Material yield variance | | |
| | | |
| Total direct labour variance | | |
| Wage rate variance | | |
| Labour efficiency variance | | |
| | | |
| Variable overhead efficiency variance | | |
| Variable overhead expenditure variance | | |
| | | |
| Fixed overhead expenditure variance | | |
| Fixed overhead volume variance | | |
| Fixed overhead volume efficiency variance | | |
| Fixed overhead vol. capacity variance | | |
| | | |
| Sales volume | | |
| Sales price | | |

Others (please specify): ----------

21 how do you dispose the variances?

| | |
|---|---|
| By written them against the profit and loss account | |
| Use them to adjust the stocks | |
| They are not recorded at all | |

Other (please specify) ----------

-- ----------

22 What types of standards do you use?

| | |
|---|---|
| Ideal standards | |
| Basic standards | |
| Attainable current standards | |

# Appendix B: The main survey questionnaire and covering letter

University of BRISTOL

Ali Ibrahim
PhD student
University of Bristol
Department of Economics
Tartous POB: 110
Syria
Tel: 0096343 751038
Email: A.Ibrahim@bristol.ac.uk

Date / / /2005

Dear Mr. Mrs. Miss,
My name is Ali Ibrahim, a PhD student at the University of Bristol, UK. This questionnaire is part of my PhD research, which examines the practice of standard costing in Syrian public companies from the perspective of new institutional theory.

The research aims to examine the extent of use of standard costing and how it has been implemented in Syrian public companies. It also explores the extent to which this practice is affected by the institutional and intra-organizational conditions in Syrian public companies context.

I would like to express my gratitude for your very kind participation, and for devoting part of your valuable time to fill in this questionnaire. Without your participation no development in the practice of management accounting techniques will be achieved, and our understanding of the conditions that govern their characteristics and development will be deficient.
Before you start to fill the questionnaire I would like to draw your attention to the following points:

- **Please read the questions and circle the number that best reflects your opinion.**
- **A note was put between brackets that explain how to answer each question.**
- **All terms were explained and presented in the last two pages of the questionnaire, so that you could refer to them if you found difficulties in understanding any of them.**
- **All the information provided will be treated as very confidential, and will be used for scientific research purposes only.**
- **If you have any queries and want to have a copy of the research findings please contact the researcher at the above shown address.**

Yours Sincerely:

Ali Ibrahim

University of BRISTOL

# A Survey into Standard costing practices in Syrian public companies: *An exploration for the impact of institutional, technical and intra-organizational factors.*

Ali Ibrahim

School of Economics, Finance and Management
University of Bristol

## General information:

1- Main product ---------- -------

2- Number of employees in your company: ---------- ----------

## Personal Information:

3- Position of the respondent (circle please)

| Financial controller | Accounts manager | costs department manger |
|---|---|---|
| 1 | 2 | 3 |

Other----------

4- Years of experience in the company: ----------

5- Years of experience in the position----------

6- Academic qualifications (circle please):

| Postgraduate | undergraduate | collage |
|---|---|---|
| 1 | 2 | 3 |

Other (please specify) ----------

7- Do you have any professional accounting certification?(circle please)

| Yes | No |
|---|---|
| 1 | 2 |

**Standard costing – and the external environment:**

8- Indicate to what extent standard costing is in use in your company (please circle)?

| Not in use | partially in use | extensively in use |
|---|---|---|
| 1 | 2 | 3 |

**If you chose 1 answer the questions 9 to 12 only**

9- Listed below are some statements related to institutional and technical forces in your external environment that might have an effect on the extent of use of SCS. Please circle the number that expresses most nearly your agreement with each statement

| | **Strongly Disagree (1)** | **Disagree (2)** | **Slightly Disagree (3)** | **Neither agree nor disagree (4)** | **Slightly Agree (5)** | **Agree (6)** | **Strongly Agree (7)** |
|---|---|---|---|---|---|---|---|
| Supervisory authority has been serious in introducing SCS in your company | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Supervisory authority has had a considerable impact on the decision to use SCS | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Your company has received supervisory authority support for introducing SCS | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Supervisory authority frequently asks you to provide reports about costs standards and variances in your company | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Supervisory authority has required the use of cost standards in your industry | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | | |
| There is a large number of competitors in the market of your main products | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Your company operates in a competitive environment | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Price competition is intense in your industry | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Your company faces quality challenge from competitors | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Your company faces customer service challenge from competitors | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Standard costing – and the internal environment**

10- The following table contains some statements that describe the organizational characteristics that might affect the extent of use of standard costing. How would you agree with each of the listed statements? (Please circle)

| | Strongly Disagree (1) | Disagree (2) | Slightly Disagree (3) | Neither agree nor disagree (4) | Slightly Agree (5) | Agree (6) | Strongly Agree (7) |
|---|---|---|---|---|---|---|---|
| Your staff have received a good training on how to use SCS | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Your staff have good experience on how to use SCS | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Top management has shown good support for introducing SCS | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Top management has good knowledge of SCS | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Middle management has good knowledge of SCS | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Accountants have good knowledge of SCS | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Management inertia has delayed the introduction of SCS in your company | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Lack of qualified management has delayed the introduction of SCS | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Your company has been lack for qualified technical staff (Engineers) | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| There is a lack for co-operation between technical and accounting staff in respect of how to establish cost standards in your company. | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Your company has received consultancy from SCS experts | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Your company has computerized its costing system | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Reliance on out of date manufacturing technology causes resistance to the use of SCS in your company | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

11 The extent of use of SCS might also be affected by the willingness of managers to consider the technique, please indicate your agreement with each of the following statements (Please circle)

| | Strongly Disagree (1) | Disagree (2) | Slightly Disagree (3) | Neither agree nor disagree (4) | Slightly Agree (5) | Agree (6) | Strongly Agree (7) |
|---|---|---|---|---|---|---|---|
| Top management has been willing to use SCS because other companies in the same industry do so | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Top management has been willing to use SCS to satisfy the supervisory authority | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Top management has been willing to use SCS to avoid questioning from the supervisory authority | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Top management has been willing to use SCS to improve efficiency | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Top management has been willing to use SCS to control managers | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Top management has been willing to use SCS to control workers | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Lack of personal financial incentive makes top management in your company unwilling to use SCS | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| Lack of personal financial incentive makes middle management in your company unwilling to use SCS | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| The fear of holding responsibility makes top management unwilling to use SCS | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

12 How do you agree that the following statements describe the production conditions in your company?

| | Strongly Disagree (1) | Disagree (2) | Slightly Disagree (3) | Neither agree nor disagree (4) | Slightly Agree (5) | Agree (6) | Strongly Agree (7) |
|---|---|---|---|---|---|---|---|
| The production process in your plant consists of repetitive operations | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Your company produces limited number of products | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Your company produces standardized products | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| There is a clear relationship between inputs and outputs in your company | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**Standard costing Operation:**

13 To what extent are the following methods used by your company to set labour and material standards? (Please circle)

| | Never (1) | Rarely (2) | Sometimes (3) | Often (4) | Always (5) |
|---|---|---|---|---|---|
| Standards based on design / engineering studies. | 1 | 2 | 3 | 4 | 5 |
| Observation based on trial runs. | 1 | 2 | 3 | 4 | 5 |
| Work study technique | 1 | 2 | 3 | 4 | 5 |
| Average of historical usage | 1 | 2 | 3 | 4 | 5 |

14 How frequently are the standards revised? (Please circle)

| | |
|---|---|
| Monthly | 1 |
| Semi annually | 2 |
| Annually | 3 |
| Continuously | 4 |
| When variance implies that the standard has changed. | 5 |

15 Which of the following standards are usually established in your company?

| | |
|---|---|
| Direct material quantity standards | 1 |
| Direct material price standards. | 2 |
| Direct labour quantity (hours) standards | 3 |
| Direct labour rate standards. | 4 |
| Variable overhead rate standard. | 5 |
| Fixed overhead rate standard. | 6 |

Other (please specify) ----------

---

16 What types of standards do you use?

| | |
|---|---|
| Ideal standards | 1 |
| Basic standards | 2 |
| Attainable current standards | 3 |

17 -please indicate how frequently are the following variances are computed by your company? (Please circle)

| The variance | Never (1) | Rarely (2) | Sometimes (3) | Often (4) | Always (5) |
|---|---|---|---|---|---|
| Total direct material variance | 1 | 2 | 3 | 4 | 5 |
| Direct material price variance | 1 | 2 | 3 | 4 | 5 |
| Direct material usage variance | 1 | 2 | 3 | 4 | 5 |
| Direct material mix variance | 1 | 2 | 3 | 4 | 5 |
| Direct material yield variance | 1 | 2 | 3 | 4 | 5 |
| | | | | | |
| Total direct labour variance | 1 | 2 | 3 | 4 | 5 |
| Wage rate variance | 1 | 2 | 3 | 4 | 5 |
| Labour efficiency variance | 1 | 2 | 3 | 4 | 5 |
| | | | | | |
| Variable overhead efficiency variance | 1 | 2 | 3 | 4 | 5 |
| Variable overhead expenditure variance | 1 | 2 | 3 | 4 | 5 |
| | | | | | |
| Fixed overhead expenditure variance | 1 | 2 | 3 | 4 | 5 |
| Fixed overhead volume variance | 1 | 2 | 3 | 4 | 5 |
| Fixed overhead volume efficiency variance | 1 | 2 | 3 | 4 | 5 |
| Fixed overhead volume capacity variance | 1 | 2 | 3 | 4 | 5 |
| | | | | | |
| Sales margin volume | 1 | 2 | 3 | 4 | 5 |
| Sales price | 1 | 2 | 3 | 4 | 5 |

Others (please specify): ----------

18 how do you deal with variances in your company?

| | |
|---|---|
| By writing them against the profit and loss account | 1 |
| Use them to adjust the stocks | 2 |
| They are not recorded, but are declared outside the accounts | 3 |

**Other (please specify)** ----------

19 listed below are some statements that might explain the type of variances reported in your company. Please indicate your agreement with each of the following statements? (Please circle)

| | Strongly Disagree (1) | Disagree (2) | Slightly Disagree (3) | Neither agree nor disagree (4) | Slightly Agree (5) | Agree (6) | Strongly Agree (7) |
|---|---|---|---|---|---|---|---|
| Range of variances reported is influenced by management needs and requirements | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Range of variances reported is influenced by supervisory authority demands and requirements | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Range of variances reported is influenced by the controllability of the cost elements | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| The reliance on other techniques (such as Budgets) has influenced variances reported | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Range of variances reported is influenced by what the regulations demands and require (UAS) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Conflicting regulations (such as employment laws) have made calculating and reporting labour variances useless | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Level of experience in SCS has influenced the reported variances | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

20 How important standard costing in serving the following purposes in your company

| | Of no importance 1 | Slight Important 2 | Moderate Important 3 | Important 4 | Vitally important 5 |
|---|---|---|---|---|---|
| Cost control and performance evaluation | 1 | 2 | 3 | 4 | 5 |
| Costing inventory | 1 | 2 | 3 | 4 | 5 |
| Computing product costs for decision making (e.g. Setting selling prices) | 1 | 2 | 3 | 4 | 5 |
| As an aid to budgeting | 1 | 2 | 3 | 4 | 5 |
| Data processing economies | 1 | 2 | 3 | 4 | 5 |

21 To what extent the following management accounting practices are in use in your company? (Please circle)

| | Not used (1) | Partially (2) | Extensively (3) |
|---|---|---|---|
| Total quality management (TQM). | 1 | 2 | 3 |
| Just in Time (JIT) | 1 | 2 | 3 |
| Activity based costing (ABC) | 1 | 2 | 3 |
| Budgetary control | 1 | 2 | 3 |
| Financial performance measures | 1 | 2 | 3 |
| Non -financial performance measures | 1 | 2 | 3 |

**Thank you for devoting part of your valuable time to fill in this questionnaire. If you have any comments please add them in this page:**

University of BRISTOL

علي إبراهيم
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محافظة طرطوس
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هاتف: 351038
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السيد ---------- المحترم

اسمي علي ابراهيم طالب دكتوراه في جامعة بريستول في المملكة المتحدة. يشكل هذا الأستبيان الذي يتناول واقع تطبيق نظام التكاليف المعيارية في شركات القطاع العام في سوريا من منظور نظرية التشريعات و النظم جزءا من بحثي لنيل درجة الكتوراه.
الهدف الرئيسي من هذا البحث هو تفحص مستوى تطبيق نظام التكاليف المعيارية و الكيفية التي أستخدم فيها في شركات القطاع العام الصناعي في سوريا ، و دراسة مدى تأثر مستوى التطبيق بالعوامل التنظيمية الخاصة بالبيئة الداخلية للمنظمات و العوامل الأخرى الخارجية المتعلقة بالبيئة التشريعية التي تعمل في ظلها شركات القطاع العام .

أود ان أتوجه بالشكر الجزيل لمشاركتكم الكريمة وأعبر عن خالص الأمتنان لتخصيص جزئ من وقتكم الثمين لإملاء هذا الإستبيان. من دون مشاركتكم لا يمكن أن نحقق أي تطوير في الجانب التطبيقي لنظم المحاسبة الإدارية و سيبقى فهمنا للعوامل التي تحكم تطور هذه النظم و خصائصها ناقصا".

قبل البدء بإملاء الإستبيان أود أن ألفت عنايتكم إلى النقاط التالية :

**- يرجى قراءة الأسئلة و وضع الرقم الدال على إجابتكم ضمن دائرة.**
**- لقد تم وضع ملاحظة بين قوسين في كل سؤال تشرح كيفية الإ جابة عليه.**
**- لقد تم شرح جميع المصطلحات المستخدمة و أرفقت في الصفحتين الأخيرتين من الإستبيان للعودة لها في حال إشتكل عليكم أي مصطلح.**
**- جميع المعلومات المقدمة هي في غاية السرية و ستستخدم البيانات لأغراض البحث العلمي فقط.**
**- في حال رغبتكم بالإستفسار عن أية معلومات أو رغبتكم بالحصول على نسخة من البحث يمكنكم الإتصال بالباحث على العنوان المبين أعلاه .**

**مع خالص الشكر لتعاونكم**

**علي إبراهيم**

٢٠٠٥/ / /

University of BRISTOL

# إ ستبيان حول واقع تطبيق نظام التكاليف المعيارية في شركات القطاع العام في سوريا

*(إ ستكشاف أثر العوامل التشريعية والعوامل التنظيمية الداخلية)*

# A Survey into Standard costing practices in Syrian public companies

*An exploration for the impact of institutional, technical and intra-organizational factors*


**علي إبراهيم**
**طالب دكتوراه (PhD)**
**قسم المحاسبة و التمويل**
**جا معة بريستول**
**بريطانيا**

## *معلومات عامة*

1- المنتج الرئيسي:----------

2 - كم يبلغ عدد العا ملين في شركتكم على وجه التقريب ----------

## *معلومات شخصية*

3- المركز الوظيفي ( من فضلكم ضعوا الرقم الذي يشير للإجابة الملائمة ضمن دائرة)

| مدير مالي | مدير حسابات | رئيس دائرة التكاليف |
|---|---|---|
| 1 | 2 | 3 |

مركز وظيفي آ خر ( حددوا من فضلكم)----------

4- عدد سنو ات الخدمة في المكان الوظيفي :----------

5- عدد سنوات الخدمة في الشركة:----------

6- الشهادات العلمية ( من فضلكم ضعوا الرقم الذي يشير للإجابة الملائمة ضمن دائرة)

| عُليا | جامعية | متوسطة |
|---|---|---|
| 1 | 2 | 3 |

شهادة آ خرى ( حددوا من فضلكم)----------

7- هل تحملون أية شهادة محاسبية مهنية: ( من فضلكم ضعوا الرقم الذي يشير للإجابة الملائمة ضمن دائرة)

| نعم | لا |
|---|---|
| 1 | 2 |

## *معلومات حول مدى تطبيق نظم التكاليف المعيارية و العوامل المؤثرة في ذلك:*

**8- إلى أي مدى تستخدم شركتكم نظام التكاليف المعيارية ( يرجى وضع الرقم الدال على الإجابة الملائمة ضمن دائرة)؟**

| غير مطبق | مطبق جزئياً | مطبق بشكل كامل |
|---|---|---|
| 1 | 2 | 3 |

**إذا اخترتم الإجابة رقم (1) أي إذا كان النظام غير مطبق لديكم أجيبوا من فضلكم على الأسئلة من (9) إلى (12) فقط أما اذا كان النظام مطبقا بأي شكل من الأشكال فيرجى الاجابة على كل الأسئلة.**

**9- في القائمة التالية تمّ إدراج بعض العبارات التي تصف بعض عناصر البيئة التشريعية و عناصر البيئة الخارجية التي تعملون بها والتي ربما كان لها أثر على مدى تطبيق نظام التكاليف المعيارية في شركتكم.**
**( من فضلكم ضعوا الرقم الدال على مدى موافقتكم على كل عبارة ضمن دائرة) :**

| | غير موافق على الإطلاق (1) | غير موافق (2) | قليلاً غير موافق (3) | لا موافق و لا غير موافق (4) | موافق قليلاً (5) | موافق (6) | موافق جداً (7) |
|---|---|---|---|---|---|---|---|
| لقد كانت الجهة الوصائية التي تتبعون إليها جادة في إدخال النظام المعياري في شركتكم | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد تلقت شركتكم دعم الجهة الوصائية لإدخال النظام المعياري | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد كانت الجهة الوصا نية تطالبكم بإستمرار بالتقرير عن المعايير والإنحرافات لديكم | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد فرضت الجهة الوصائية إستخدام المعايير على مستوى صناعتكم | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد كان للجهة الوصا نية أثر كبير على قرار ادخال النظام في شركتكم | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تمارس شركتكم نشاطها في بيئة شديدة المنافسة | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| هناك عدد كبير من المنافسين لشركتكم في سوق منتجاتها الرئيسية | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تواجه شركتكم تحدٍ في أسعار المنتجات من جانب المنافسين | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تواجه شركتكم تحدٍ في جودة المنتجات من جانب المنافسين | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تواجه شركتكم تحدٍ في نوعية خدمة الزبائن المقدمة مقارنة مع المنافسين | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| البيئة التشريعية تمتاز بالتقلب المستمر | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| من الصعب التنبؤ بأسعار الموارد في بيئتكم | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**10- الجدول التالي يتضمن بعض الخصائص التنظيمية التي تعكس القدرة على استخدام نظام التكاليف المعيارية, والتي ربما كان لها أثراً على مدى تطبيق النظام في شركتكم. إلى أي مدى توافقون على كل من العبارات التالية ( يرجى وضع الرقم الدال على مدى موافقتكم على كل بند ضمن دائرة):**

| | غير موافق على الإطلاق (1) | غير موافق (2) | قليلاً غير موافق (3) | لا موافق و لا غير موافق (4) | موافق قليلاً (5) | موافق (6) | موافق جداً (7) |
|---|---|---|---|---|---|---|---|
| لقد تلقى الكادر الوظيفي المعني تدريب جيد على كيفية تشغيل النظام | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لدى الكادر الوظيفي المعني خبرة جيدة فيما يتعلق بكيفية تشغيل النظام | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد أظهرت الإدارة العليا في شركتكم دعماً جيداً لإدخال النظام | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تمتلك الإدارة العليا في شركتكم معرفةجيدة بنظام التكاليف المعيارية | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تمتلك الإدارة المتوسطة ( الأقسام) في شركتكم معرفةجيدة بنظام التكاليف المعيارية | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| يمتلك المحاسبون في شركتكم معرفة جيدة بنظام التكاليف المعيارية | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| إهمال الإدارة أخر إدخال النظام في شركتكم | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| الإفتقار الى الإدارة العلمية أخر إدخال النظام في شركتكم | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| تفتقر شركتكم إلى كادر تقني ( مهندسون) مؤهل قادر على تطوير معايير علمية | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| هناك إفتقار للتعاون الجيد ما بين الكادر التقني( المهندسون) و المحاسبي فيما يتعلق بإعداد المعايير | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| لقد توفر لشركتكم تلقي استشارة جهات صاحبة خبرة في نظام التكاليف المعيارية | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| قامت شركتكم بأتمتة نظامها التكاليفي | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| الاعتماد على تكنولوجيا صناعية متقادمة أدى إلى مقاومة إستخدام النظام في شركتكم | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

**11- قد يتأثر مدى استخدام نظام التكاليف المعيارية بمدى رغبة المدراء بتطبيق النظام أشيروا من فضلكم إلى مدى موافقتكم على كل من العبارات التالية ( يرجى وضع الرقم الدال على موافقتكم على كل بند ضمن دائرة)**

| | غير موافق على الإطلاق (1) | غير موافق (2) | قليلاً غير موافق (3) | لا موافق و لا غير موافق (4) | موافق قليلاً (5) | موافق (6) | موافق جداً (7) |
|---|---|---|---|---|---|---|---|
| لقد رغبت الإدارة العليا لديكم بتطبيق النظام لكونه مستخدم في شركات مماثلة لشركتكم | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد رغبت الإدارة العليا في شركتكم بتطبيق النظام لأن ذلك سيمكنها من إرضاء الجهة الوصائية | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد رغبت الإدارة العليا في شركتكم بتطبيق النظام لأن ذلك يجنبها المُساءلة التي قد تنجم عن عدم التطبيق | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | | |
| لقد رغبت الإدارة العليا في شركتكم بتطبيق النظام لتطوير مستوى الكفاءة في الأداء | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد رغبت الإدارة العليا في شركتكم بتطبيق النظام لتحقيق رقابة على المدراء | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| لقد رغبت الإدارة العليا في شركتكم بتطبيق النظام لتحقيق رقابة على العاملين | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| عدم توفر حافز مادي لدى الإدارة العليا في شركتكم جعلها غير راغبة بتطبيق النظام | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| عدم توفر حافز مادي لدى الإدارة المتوسطة في شركتكم جعلها غير راغبة بتطبيق النظام | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
| الخوف من تحمل المسؤولية جعل الإدارة العليا غير راغبة في استخدام النظام | 7 | 6 | 5 | 4 | 3 | 2 | 1 |

**- 12إلى أي مدى توافقون بأن العبارات التالية تصف ظروف عملية االإ نتاج في شركتكم (يرجى وضع الرقم الدال على إجابتكم ضمن دائرة)**

| | غير موافق على الإطلاق (1) | غير موافق (2) | قليلاً غير موافق (3) | لا موافق و لا غير موافق (4) | موافق قليلاً (5) | موافق (6) | موافق جداً (7) |
|---|---|---|---|---|---|---|---|
| عملية الإ نتاج في شركتكم تتكو ن من مراحل صناعية متكررة | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تقوم شركتكم بإ نتاج عدد محدود من المنتجات | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تقوم شركتكم بإ نتاج منتجات نمطية | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| هناك علاقة واضحة ما بين عناصر المدخلات و المخرجات في شركتكم | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

13إلى أي مدى تستخدم شركتكم الطرق التالية في إعداد معايير الأجور و المواد المباشر:
(يرجى وضع الرقم الدال على إجابتكم ضمن دائرة)

| | غير مستخدمة 1 | نادراً 2 | في بعض الأحيان 3 | غالباً 4 | دائماً 5 |
|---|---|---|---|---|---|
| .طريقة متوسط الإستخدام في السنوات السابقة | 1 | 2 | 3 | 4 | 5 |
| طريقة دراسة تصميم المنتج والدراسات الهندسية | 1 | 2 | 3 | 4 | 5 |
| طريقة الملاحظة و الدورات التجريبية | 1 | 2 | 3 | 4 | 5 |
| طريقة دراسة الحركة و تحليل العمل | 1 | 2 | 3 | 4 | 5 |

14 إ لى أي مدى يعاد النظر في المعايير لديكم (يرجى وضع الرقم الدال على إجابتكم ضمن دائرة)

| | |
|---|---|
| شهريا" | 1 |
| نصف سسنويا" | 2 |
| سنويا" | 3 |
| بإستمرار | 4 |
| عندما تشير الإنحرافات إلى تغير المعيا ر | 5 |

فواصل زمنية أخرى حددوا من فضلكم( 6)----------

15 أيا" من المعايير التالية تستخدم عادة في شركتكم (يرجى وضع الرقم الدال على إجابتكم ضمن دائرة ( يمكنكم اختيار أكثر من إ جابة ) ؟

| | |
|---|---|
| معايير كمية ( إستخدام) المواد المباشرة | 1 |
| معايير سعر المواد المباشرة | 2 |
| معايير كمية (ساعات) العمل المباشر | 3 |
| معايير معدل الأجر | 4 |
| معايير المعدل المتغير للأعباء غير المباشرة | 5 |
| معايير المعدل الثابت للأعباء غير المباشرة | 6 |

معايير أخرى حددوا من فضلكم:----------
----------

16أي نوع من المعاييرالتالية تستخدمون (يرجى وضع الرقم الدال على إجابتكم ضمن دائرة) ؟

| | |
|---|---|
| معايير مثالية | 1 |
| معايير أساسية | 2 |
| معايير طبيعية | 3 |
| معايير جارية قابلة لتحقيق | 4 |

**17- لى أي مدى تحتسب و يتم التقرير عن الإنحرافات التالية في شركتكم :**
**( يرجى وضع الرقم الدال على إجابتكم ضمن دائرة )**

| | غير مستخدمة 1 | نادراً 2 | في بعض الأحيان 3 | غالباً 4 | دائماً 5 |
|---|---|---|---|---|---|
| الإنحراف الإجمالي للمواد المباشرة | 1 | 2 | 3 | 4 | 5 |
| الإنحراف الكمي للمواد | 1 | 2 | 3 | 4 | 5 |
| الإنحراف السعري للمواد | 1 | 2 | 3 | 4 | 5 |
| إنحراف مزج المواد | 1 | 2 | 3 | 4 | 5 |
| إنحراف العائد للمواد | 1 | 2 | 3 | 4 | 5 |
| الإنحراف ا لإجمالي للاجور | 1 | 2 | 3 | 4 | 5 |
| إنحراف معدل الاجر | 1 | 2 | 3 | 4 | 5 |
| إنحراف كفاءة العمل | 1 | 2 | 3 | 4 | 5 |
| إنحراف الكفاءة للأعباء المتغيرة | 1 | 2 | 3 | 4 | 5 |
| إنحراف الانفاق للأعباء المتغيرة | 1 | 2 | 3 | 4 | 5 |
| إنحراف الانفاق للأعباء الثابتة | 1 | 2 | 3 | 4 | 5 |
| إنحراف الحجم للأعباء الثابتة | 1 | 2 | 3 | 4 | 5 |
| إنحراف حجم الطاقة | 1 | 2 | 3 | 4 | 5 |
| إنحراف حجم الكفاءة | 1 | 2 | 3 | 4 | 5 |
| إنحراف حجم المبيعات الحدي | 1 | 2 | 3 | 4 | 5 |
| إنحراف سعر البيع الحدي | 1 | 2 | 3 | 4 | 5 |

انحرافات أخرى حدد من فضلك .....

.....

**18 كيف تجري معالجة الانحرافات محاسبيا" في شركتكم ( يرجى وضع الرقم الدال على إجابتكم ضمن دائرة)**

| | |
|---|---|
| بإقفالها في حساب الأرباح والخسائر | 1 |
| تستخدم لتعديل قيمة المخزون السلعي آخر المدة | 2 |
| لا يجري إثبات للإنحرافات محاسبياً بل يتم التقرير عنها إحصائياً خارج الدفاتر | 3 |

طرق آخرى حدد من فضلك .....

.....

19- فيما يلي بعض العبارات التي ربما تفسر نوع الإنحرافات التي يتم التقرير عنها في شركتكم أشيروا من فضلكم إلي مدى موافقتكم علي كل عبارة ( يرجي وضع الرقم الدال علي إجابتكم ضمن دائرة )

| | غير موافق علىالإطلاق (1) | غير موافق (2) | قليلاً غير موافق (3) | لا موافق و لا غير موافق (4) | موافق قليلاً (5) | موافق (6) | موافق جداً (7) |
|---|---|---|---|---|---|---|---|
| مدى الإنحرافات التي يتم التقريرعنها قد تأثر بما تطلبه الإ دارة العليا في شركتكم من معلومات | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| مدى الإنحرافات التي يتم التقريرعنها قد تأثر بما تطلبه الجهة الوصائية من معلومات | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| الإعتماد على طرق أخرى في رقابة التكاليف (كالموازنات التقديرية) أثر على مدى الإنحرافات | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| مدى الإنحرافات التي يتم التقريرعنها قد تأثر بقابلية عنصر التكلفة للرقابة و المعايرة | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| مدى الإنحرافات التي يتم التقرير عنها قد تأثر بما تطلبه التشريعات المحاسبية ( النظام المحاسبي الموحد) | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| تشريعات العمل و سياسات التوظيف جعلت حساب و التقرير عن إنحرافات الأجور عديم الفائدة | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| مستوى المعرفة و الخبرة بالنظام قد أثر على مدى الإ نحرافات التي يتم التقرير عنها | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

20 كيف تقدرون أهمية نظام التكاليف المعيارية في خدمة الأغراض التالية في شركتكم

| | غير مهم 1 | أقل من متوسط الأهمية 2 | متوسط الأهمية 3 | أعلى من متوسط الأهمية 4 | مهم جداً 5 |
|---|---|---|---|---|---|
| .الرقابة على التكاليف و تقييم الأداء | 1 | 2 | 3 | 4 | 5 |
| تقييم المخزون السلعي | 1 | 2 | 3 | 4 | 5 |
| احتساب تكاليف المنتجات لخدمة عملية اتخاذ .القرارات ( تحديد أسعار المنتجات) | 1 | 2 | 3 | 4 | 5 |
| المساعدة في إعداد الموازنات التقديرية | 1 | 2 | 3 | 4 | 5 |
| تسهيل عملية التسجيل المحاسبي و معالجة البيانات | 1 | 2 | 3 | 4 | 5 |

21 الى أي مدى تطبق شركتكم نظم المحاسبة الإدارية التالية
( يرجي وضع الرقم الدال على الإجابة الملائمة ضمن دائرة)

| | غير مطبق 1 | مطبق جزئياً 2 | مطبق بشكل كامل 3 |
|---|---|---|---|
| نظام إدارة الجودة الشاملة | 1 | 2 | 3 |
| نظام الإنتاج بالتوقيت المنضبط | 1 | 2 | 3 |
| نظام تحديد التكلفة على أساس الأنشطة | 1 | 2 | 3 |
| نظام الموازنات التقديرية | 1 | 2 | 3 |
| مؤشرات تقييم الأداء المالي | 1 | 2 | 3 |
| مؤشرات تقييم الأداءغير المالي | 1 | 2 | 3 |

شكراً جزيلاً لتعاونكم .
اذا كان لديكم أية ملاحظات يمكن اضافتها في هذه الصفحة.

# Guidance to the main terms
# دليل المصطلحات

***التكاليف المعيارية :*** هي تكاليف محددة مقدماً و تمثل تكاليف مستهدفة يجب تحقيقها في ظل ظروف تشغيل كفؤة, وتشمل مختلف عناصر التكلفة حيث تقاس إليها التكاليف الفعلية بغية تحديد الإنحرافات ومساعدة الإدارة في ممارسة وظائفها في التخطيط و الرقابة و اتخاذ القرارات.

***طريقة الدراسات الهندسية:*** هي طريقة يتم من خلالها إعداد المعايير عبر دراسة تفصيلية لكل مرحلة من مراحل الإنتاج , حيث يصار إلى تحديد مستلزمات تنفيذها من مواد وعمالة و تجهيزات عبر الملاحظة و الضبط المنهجي .

***طريقة متوسط الاستخدام:*** طريقة يتم من خلالها إعداد معايير المواد و الأجور باستخدام سجلات الأداء التاريخي حيث يؤخذ متوسط أرقام الأداء التاريخي لعدد من السنوات السابقة ثم يتم تعديلها بنسبة معينة إرتجالية.

***معايير كمية المواد المباشرة:*** هي معايير تحدد كمية المواد للازمة لإنتاج وحدة المنتج في كل مرحلة من مراحل الإنتاج ، بعد الأخذ في الإعتبار أية خسائر تشغيل أو مسموحات للفاقد لا يمكن تجنبها و التي تقع أثناء التشغيل.

***معايير سعر المواد:*** وهي الأسعار التي يحددها قسم المشتريات على أساس دراسة وتحليل المصادر البديلة المختلفة للحصول على المواد وفق متطلبات الجودة المحددة و انتقاء الموردين اللذين يستطيعون تقديم هذه المواد بأفضل الأسعار، مع أخذ شروط التسليم و الحسومات الممكنة بعين الإعتبار.

***إنحراف سعر المواد:*** هو الفارق ما بين السعر المعياري و السعر الفعلي للوحدة من المواد مضروباً بحجم الكمية المشتراة.

***إنحراف كمية (استخدام) المواد:*** هو الفارق مابين الكمية المعيارية اللازمة للإنتاج الفعلي والكمية الفعلية المستخدمة مضروباً بالسعر المعياري للوحدة من وذلك بالنسبة لكل صنف من المواد.

***الإنحراف الإجمالي للمواد:*** و هو الفارق ما بين التكلفة المعيارية للمواد محسوبة على أساس حجم الإنتاج الفعلي و التكلفة الفعلية لكل صنف من المواد

***إنحراف مزج المواد*** و هو إنحراف ينشأ من إختلاف المزيج المعياري الذيَ استخدم في حساب التكاليف المعيارية عن المزيج الفعلي

***إنحراف العائد للمواد:*** ينشأ هذا الإنحراف من إختلاف الحجم المعياري للمخرجات من أجل مستوى معين من المدخلات عن حجم المخرجات الفعلية المتحقق.

***إنحراف معدل الأجر:*** هو الفرق ما بين معدل الأجر المعياري للساعة و معدل الأجر الفعلي مضروباً بساعات العمل الفعلية

***إنحراف كمية العمل ( إنحراف الكفاءة):*** و هو الفارق ما بين ساعات العمل المعيارية اللازمة للإنتاج الفعلي وساعات العمل الفعلية مضروباً بمعدل الأجر المعياري للساعة.

***الإنحراف الإجمالي للأجور:*** هو الفرق مابين التكلفة المعيارية للأجور محسوبة على أساس حجم الإنتاج الفعلي و التكلفة الفعلية للأجور.

***الأعباء المتغيرة*** و هي كافة التكاليف التي لا يمكن نسبتها إلى موضع تكلفة معين و التي تتغير طرداً مع تغير حجم النشاط.

***الإنحراف الإجمالي للأعباء المتغيرة:*** هو الفرق ما بين التكلفة المعيارية للأعباء المتغيرة المحملة على الإنتاج الفعلي و التكاليف الفعلية للأعباء المتغيرة.

***إنحراف الإنفاق للأعباء المتغيرة :*** هو الفرق مابين الأعباء غير المباشرة المتغيرة محتسبة من واقع الموازنة المرنة عند مستوى النشاط الفعلي و الأعباء غير المباشرة الفعلية التي تم تحملها خلال الفترة.

***إنحراف الكفاءة للأعباء المتغيرة :*** هو الفرق مابين الساعات المعيارية للإنتاج الفعلي و الساعات الفعلية مضروباً بمعدل التحميل المتغير للأعباء غير المباشرة.

***إنحراف الإنفاق للأعباء الثابتة:*** هو الفرق ما بين الأعباء الغير مباشرة الثابتة المخططة و الأعباء الغير مباشرة الثابتة الفعلية.

***انحراف حجم الطاقة*** هو الفرق ما بين ساعات العمل الفعلية و ساعات العمل المخططة وفق الموازنة مضروبة بمعدل تحميل الأعباء الثابتة.

***انحراف حجم الكفاءة*** هو الفرق ما بين الساعات المعيارية للمخرجات الفعلية و الساعات الفعلية مرجح بمعدل التحميل الثابت للأعباء غير المباشرة .

***انحراف حجم المبيعات الحدي*** هو الفرق مابين حجم المبيعات الفعلية والمخططة مضروبا بهامش المساهمة الحدي المعياري

***هامش المساهمة الحدي*** هو الفرق مابين سعر بيع الوحدة المنتجة وتكاليف الصنع المتغيرة للوحدة.

**انحراف سعر البيع الحدي** *هو الفرق مابين هامش المساهمة الفعلي و المعياري مضروبا بحجم المبيعات الفعلية.*

***المعايير الأساسية:*** و هي معايير تبقى ثابتة دون تغيير لفترة طويلة من الزمن .

***المعايير المثالية :*** و هي معايير تعكس أدنى حد ممكن للتكاليف والتي يمكن تحقيقها في ظروف التشغيل الأكثر كفاءة.

***المعايير الجارية القبلة للتحقيق:*** و هي معايير تمثل تلك التكاليف التي يجب تحملها في ظروف تشغيل كفؤة. فهي معايير صعبة و لكنها قابلة للتحقيق .

***المعايير الطبيعية :*** وهي معايير يتم تحديدها عند مستوى الطاقة الطبيعية و التي تتخذ كأساس في تحميل الأعباء غير المباشرة الثابتة ( تحدد الطاقة الطبيعية عادة بحدود 80% من الطاقة القصوى للإنتاج[1])

**نظام الانتاج بالتوقيت المنضبط:** هي طريقة للإنتاج يتم بموجبها تصنيع المنتجات عند الحاجة لها فقط، و بالتالي تسعى إلى تخفيض مستويات المخزون إلى أدنى حدود ممكنة.

**نظام تحديد التكاليف على أساس الأنشطة :** هو نظام لإدارة التكاليف يستند إلى الأنشطة كأساس لربط تكاليف الموارد الخاصة بمنظمة ما بمختلف المنتجات و الخدمات التي تقدمها للعملاء.

**نظام الموازنات التقديرية :** هو نظام يعتمد على استخدام الموازنات في التخطيط والرقابة ، و الموازنة هي تعبير كمي ، بصورة مالية، عن خطة عمل تغطي فترة مستقبلية، و تُعَدُ على مستوى كل قسم من الأقسام و على مستوى الشركة بشكل عام.

**نظام إدارة الجودة الشاملة:** هي طريقة لإ دارة و تنظيم عمل شركة ما عبر تبني مجموعة إ جراءات و ممارسات و سياسات تجعل الشركة تلتزم بتطوير مستمر في جودة جميع أنشطتها بما يمكنها من تقديم منتجات أو خدمات ذات جودة عالية تلبي أذواق المستهلكين.

**مؤشرات تقييم الأداء المالي:** وهي مجموعة من المؤشرات الكمية التي تعكس الأداء المالي للشركة و تتعلق بالمبيعات و التكاليف و الأرباح.

**مؤشرات تقييم الأداء غير المالي :** و هي مجموعة من المقاييس الكمية و النوعية التي تعكس مستوى الأداء و لكن لا يتم التعبير عنها بصورة مالية. مثال على ذلك مقاييس تعكس مستوى خدمة الزبائن ( كزمن الإستجابة لشكوى الزبائن)، مقاييس رضا الزبائن ( كعدد الشكاوى الواردة من الزبائن،عدد الشكاوى بالنسبة للزبون الواحد، نسبة الشكاوى الواردة الى المبيعات)، مقاييس خاصة بالجودة ( عدد شكاوى الزبائن، نسبة المنتجات المرفوضة، نسبة المردودات من الزبائن الى المبيعات)، مقاييس استخدام الموارد ( نسبة ساعات العمل الفعلية من إجمالي الطاقة، نسبة ساعات التعطل إلى إجمالي ساعات العمل الفعلية)

[1] F.H. Elwell, standard costs for manufacturing , McGRAW-HALL ACCOUNTING SERIES, 1953, USA, p: 37

## Appendix (C): Examining the relevance of the insignificant variables from the perspective of set-theoretic approach:

Before excluding the non-correlated conditions, which were deemed irrelevant from the variable-oriented research point of view, the researcher decided to check whether they are necessary or sufficient to the outcome from the set-theoretic logic[23]. Table (C1) shown below presents the Boolean scores for the non-correlated variables (technological task requirements (Y), perceived economic gains (E), and level of technical competitive pressures (T)). Recall that to check whether a cause is necessary for an outcome, a researcher examines the cases that show the outcome to see if they also exhibit the cause. If they do then the cause might be considered as necessary. It is also possible to use probabilistic criteria to assess the quasi-necessity, by testing whether the proportion of the cases that exhibited the outcome and exhibited also the cause is significantly greater than a certain test proportion (Ragin, 2000:131-132).

As the lower part of the table shows, out of the 16 cases that exhibited the outcome (use SCS in some form), 75% exhibited also high suitable task requirements (received Boolean value 1 on the condition Y). 56% of those cases perceived high economic gains from using SCS, and 69% of this group of SPCs received the Boolean value 1 on the condition competitive pressure (have high competitive environment). Clearly none of these conditions is necessary for the use of SCS using the veristic criteria, which means all the cases that show the outcome must uniformly show the condition in order to be considered a necessary condition (Ragin, 2000:132). Using probabilistic criteria and based on the binomial test and a test proportion of 65%, the lower part of the table shows that

[23] These variables were excluded based on standard statistical analysis. Here the decision is confirmed using QCA method.

none of the conditions passed the test of necessity ($P > 0.05$). It can be concluded, therefore, that from the necessity point of view, all the non-correlated conditions are irrelevant (not necessary). To check whether any of those conditions is sufficient for the use of SCS, the researcher examined the cases that exhibited each of these causes (have a Boolean value 1 on the condition), to see if they also exhibited the outcome. The table shows that 52.2% of the 23 cases that showed high suitable task requirements (with Boolean value1 on this condition) did show the outcome (use SCS). Similarly, 47.4% of the 19 cases that perceived high economic gains from using SCS did use SCS. Finally, 47.8% of the 23 cases that received 1 score on the condition "competitive pressure T" also exhibited usage of SCS. Again from the veristic point of view none of these conditions are sufficient for the use of SCS, because in nearly half of the cases where each of these conditions is present the outcome was absent (companies did not use SCS). Even from the perspective of probabilistic criteria, and based on a test proportion of 65%, all these non-correlated conditions are not sufficient because all the percentages of cases that exhibited the causes and showed also the outcome are less than the test proportion 65% ( see table C1).

It can be concluded, therefore, that the non-correlated factors are not only irrelevant from the correlation point of view, but they are also less relevant from the set-theoretic logic. Thus, the QCA analysis in this research focused only on the highly correlated factors, because they were considered more relevant, at least from the variable-oriented research perspective. Including only the most relevant conditions greatly simplified QCA analysis; this would be more complicated and difficult to interpret with the inclusion of less relevant factors.

**Table (C1) the Boolean scores received by respondents on the no-correlated factors and results of necessity and sufficiency tests**

| cases | Outcome Use of SCS | Task requirements (Y) | Economics Gains (E) | Competitive Pressure (T) |
|---|---|---|---|---|
| 1 | 0 | **1.00** | .00 | .00 |
| 2 | 0 | .00 | **1.00** | **1.00** |
| 3 | 0 | .00 | **1.00** | **1.00** |
| 4 | 0 | .00 | .00 | 1.00 |
| 5 | 0 | **1.00** | **1.00** | .00 |
| 6 | 0 | **1.00** | .00 | .00 |
| 7 | 0 | **1.00** | .00 | **1.00** |
| 8 | 0 | **1.00** | .00 | **1.00** |
| 9 | 0 | **1.00** | **1.00** | .00 |
| 10 | 0 | .00 | .00 | **1.00** |
| 11 | 0 | **1.00** | **1.00** | **1.00** |
| 12 | 0 | .00 | **1.00** | .00 |
| 13 | 0 | **1.00** | .00 | .00 |
| 14 | 0 | **1.00** | **1.00** | .00 |
| 15 | 0 | .00 | **1.00** | **1.00** |
| 16 | 0 | .00 | **1.00** | **1.00** |
| 17 | 0 | **1.00** | .00 | **1.00** |
| 18 | 0 | .00 | **1.00** | **1.00** |
| 19 | 0 | **1.00** | .00 | .00 |
| 20 | 0 | .00 | .00 | 1.00 |
| 21 | 1 | **1.00** | **1.00** | .00 |
| 22 | 1 | **1.00** | .00 | **1.00** |
| 23 | 1 | **1.00** | .00 | **1.00** |
| 24 | 1 | **1.00** | **1.00** | .00 |
| 25 | 1 | **1.00** | .00 | .00 |
| 26 | 1 | **1.00** | .00 | .00 |
| 27 | 1 | **1.00** | .00 | **1.00** |
| 28 | 1 | **1.00** | **1.00** | **1.00** |
| 29 | 1 | .00 | **1.00** | **1.00** |
| 30 | 1 | **1.00** | **1.00** | **1.00** |
| 31 | 1 | **1.00** | .00 | **1.00** |
| 32 | 1 | .00 | **1.00** | .00 |
| 33 | 1 | .00 | **1.00** | **1.00** |
| 34 | 1 | **1.00** | **1.00** | **1.00** |
| 35 | 1 | .00 | .00 | **1.00** |
| 36 | 1 | **1.00** | **1.00** | **1.00** |
| **% cases with the outcome that showed causes** | | **N =16, 75%** | **N =16, 56%** | **N =16, 69%** |
| **Binomial test, necessity, test proportion = 65%** | | **P = 0.289** | | **P = 0.490** |
| **% cases with the cause that showed outcome** | | **N =23, 52.2%** | **N =19, 47.4%** | **N=23, 47.8%** |

## Appendix (D): Further validation of the results of set-theoretic analysis using one and three standard error fuzzy recoding schemes:

To provide further validation to se-theoretic analysis results reported in chapter 9, the researcher used two other schemes for recoding the data into fuzzy sets. Crisp analysis, which was deemed more appropriate given the binary nature of the outcome, represented the extreme situation where cases were considered in or out of the set of a particular condition based on the median score (in if ≥ median, and out if < the median). The researcher decided to move gradually from this extreme case by recoding the data into five value fuzzy sets using firstly one SE of the median, then two SE, and 3 SE (very extreme case in the other direction) and see how results might change. Results of using two SE of the median, which represented the estimation of the 95 % confidence interval of the median, were reported in chapter 9 as a moderate case. This appendix will report the results of fuzzy analysis using one SE and three SE recoding schemes.

Tables D1 and D3 shows the schemes used to recode data into five value fuzzy sets using one SE of the median and three SE respectively.

Results of fuzzy analysis using one SE recoding scheme were shown in table D2. As the table shows the conditions (I), and (G), which were found to be necessary conditions for the use of SCS in both QCA and the two SE fuzzy recoding scheme reported in chapter 9, were also passed the test of necessity in the one SE recoding scheme (test proportion 65%, and 5% significance level). Using the toughest fuzzy recoding scheme based on three SE of the median reported also similar findings as table D4 shows.

**Table D1: The scheme used to recode data into five value fuzzy sets using 1 SE of median**

| | Conditions | | | | | Fuzzy scores | |
|---|---|---|---|---|---|---|---|
| | I | G | L | M | F | | |
| Upper limit (>Median + 1SE) through highest | ≥ 18 | ≥ 24 | ≥ 14 | ≥ 33 | ≥ 18 | 1 | Fully in |
| Between upper limit and maximum ambiguity | 17 | 22-23 | 13 | 31-32 | 17 | 0.75 | More in than out |
| Median | 16 | 21.5 | 12 | 30.5 | 16.5 | 0.5 | Neither in nor out |
| Between lower limit and maximum ambiguity | 15 | 20-21 | 11 | 29-30 | 16 | 0.25 | More out than in |
| Lower limit (> Median - 1SE) through lowest | ≤ 14 | ≤ 19 | ≤ 10 | ≤ 28 | ≤ 15 | 0 | Fully out |

**Table D2: Results of fuzzy analysis using 1SE recoding, necessity test (test proportion 65%, alpha= 5%)**

| Variables | Number of cases >= Outcome | Observed proportion | Binomial P |
|---|---|---|---|
| i | 0 | 0.00 | |
| I | 15 | 0.94 | 0.010** |
| g | 0 | 0.00 | |
| G | 15 | 0.94 | 0.010** |
| l | 0 | 0.00 | |
| L | 12 | 0.75 | 0.289 |
| m | 1 | 0.06 | |
| M | 11 | 0.69 | 0.490 |
| f | 1 | 0.06 | |
| F | 13 | 0.81 | 0.134 |

**Fuzzy solution: sufficient combinations (test proportion 65 %, alpha = 5%)**

| Expressions | Consistency | Coverage |
|---|---|---|
| | | |
| I*G*L+ | 0.96 | 0.84 |
| I*G*M+ | 0.98 | 0.84 |
| I*G*F+ | 1 | 0.86 |
| I*G*L*M+ | 0.98 | 0.77 |
| I*G*L*F | 1 | 0.75 |
| Overall coverage =0.781, all expressions are usually sufficient at 5% significance level | | |

It can be seen from table D4 that (I) and (G) passed the test of necessity at 5% significance level, but using 50 % as a test proportion. Thus even with this very tough recoding (I) and (G) continued to be (more often than not) necessary conditions for the use of SCS.

Comparing fuzzy solutions for the sufficient combinations connected with the use of SCS reported in tables D2 and D4 reveals that the one SE and the three SE fuzzy recoding schemes resulted in the same simplified combinations. These simplified combinations (after eliminating the redundant combinations using the containment rule) can be summarized in the following formula:

**I.G.L+I.G.M+I.G.F → SCS**

The coverage values of each combination in table D4 using the toughest recoding were slightly lower than their respective values reported in table D2 using the one SE recoding. The overall coverage of the fuzzy solutions using the tow schemes are, however, very similar (0.797 and 0.781, respectively); and they indicate that the two solutions cover a considerable proportion of SPCs that reported use of SCS in the sample.

Comparing the formula shown above with crisp and fuzzy solutions reported in chapter 9, (see table 9-13) indicate that they are identical.

**Table D3: The scheme used to recode data into five value fuzzy sets using 3 SE of median**

| | Conditions | | | | | Fuzzy scores | |
|---|---|---|---|---|---|---|---|
| | I | G | L | M | F | | |
| Upper limit (>Median + 3SE) through highest | ≥21 | ≥28 | ≥16 | ≥37 | ≥20 | 1 | Fully in |
| Between upper limit and maximum ambiguity | 17-20 | 22-27 | 13-15 | 31-36 | 17-19 | 0.75 | More in than out |
| Median | 16 | 21.5 | 12 | 30.5 | 16.5 | 0.5 | Neither in nor out |
| Between lower limit and maximum ambiguity | 12-15 | 16-21 | 9-11 | 25-30 | 14-16 | 0.25 | More out than in |
| Lower limit (> Median - 3SE) through lowest | ≤11 | ≤15 | ≤8 | ≤24 | ≤13 | 0 | Fully out |

**Table D4: Results of fuzzy analysis using 3SE recoding, necessity test (test proportion 50%, alpha= 5%)**

| Variables | Number of cases >= Outcome | Observed proportion | Binomial P |
|---|---|---|---|
| i | 0 | 0.00 | |
| I | 12 | 0.75 | 0.038* |
| g | 0 | 0.00 | |
| G | 14 | 0.88 | 0.002** |
| l | 0 | 0.00 | |
| L | 9 | 0.56 | 0.402 |
| m | 1 | 0.06 | |
| M | 6 | 0.37 | |
| f | 1 | 0.06 | |
| F | 4 | 0.25 | |

**Fuzzy solution: sufficient combinations (test proportion 65 %, alpha = 5%)**

| Expressions | Consistency | Coverage |
|---|---|---|
| | | |
| I*G*L+ | 0.96 | 0.78 |
| I*G*M+ | 0.96 | 0.75 |
| I*G*F+ | 0.96 | 0.72 |
| I*G*M*F+ | 0.98 | 0.66 |
| I*G*L*F+ | 0.98 | 0.64 |
| Overall coverage =0.797, all expressions are usually sufficient at 5% significance level | | |

It can be concluded, therefore, based on the different set-theoretic tests conducted in this research that the patterns of relationships explored in this thesis are very strong, and the results of set-theoretic techniques reported in chapter 9 are reasonably valid.